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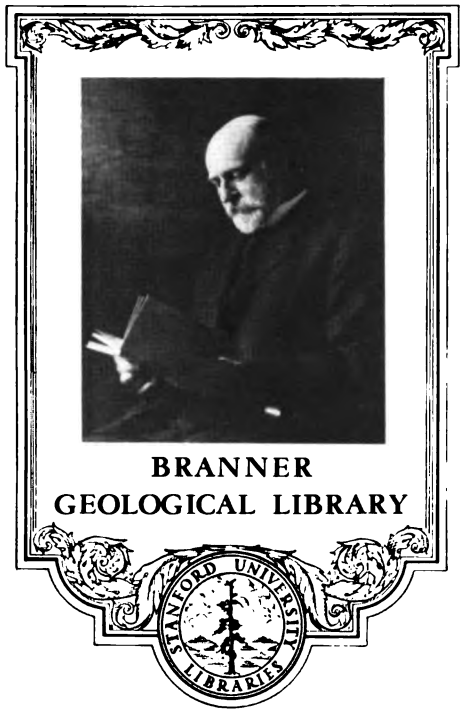
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DEPARTMENT OF THE INTERIOR

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UNITED STATES GEOLOGICAL SURVEY

VOLUME XLVIII

Part II.—PLATES.

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UNITED STATES GEOLOGICAL SURVEY

CHARLES D. WALCOTT, DIRECTOR

STATUS

OF THE

MESOZOIC FLORAS OF THE UNITED STATES

SECOND PAPER

BY

LESTER F. WARD

WITH THE COLLABORATION OF

WILLIAM M. FONTAINE, ARTHUR BIBBINS, AND G. R. WIELAND

Part II.—PLATES.

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Triassic Flora of Arizona.

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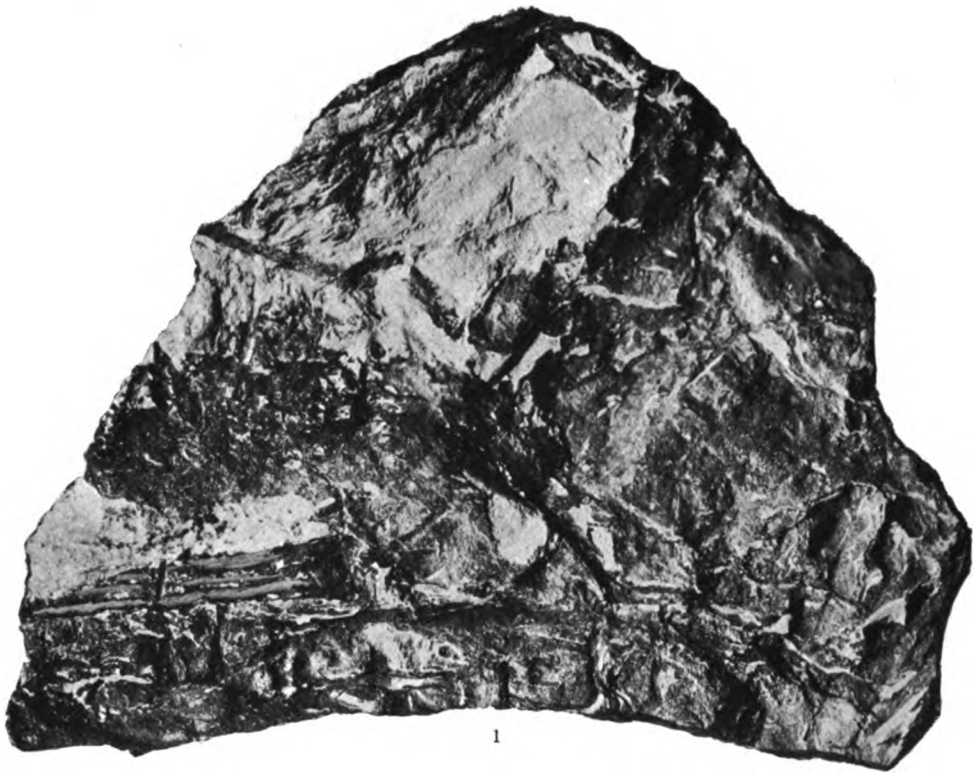

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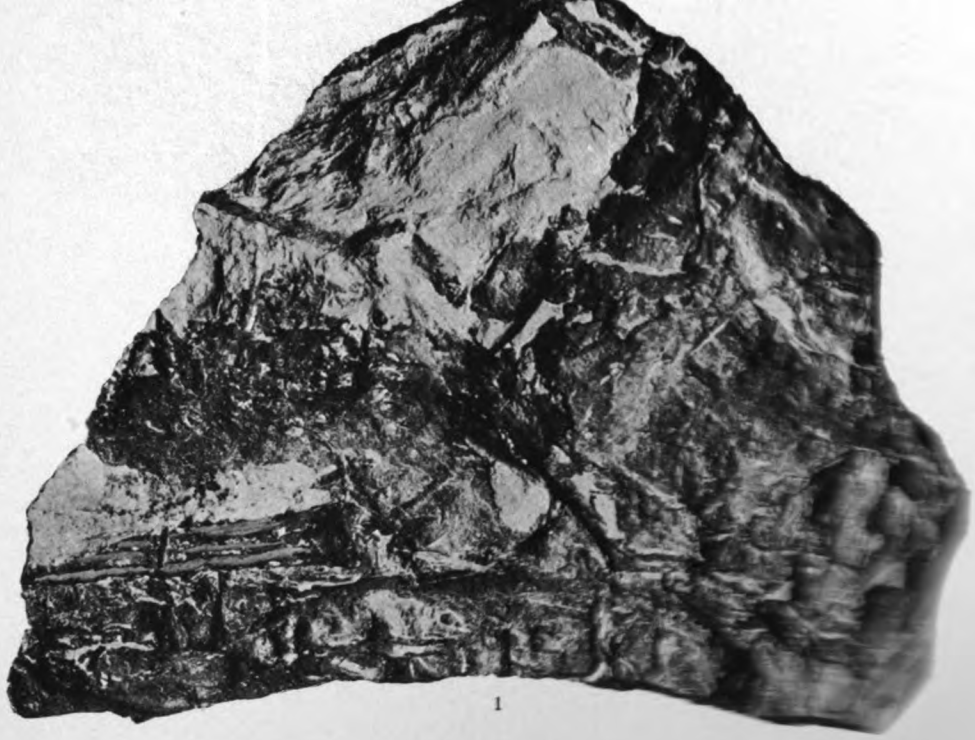

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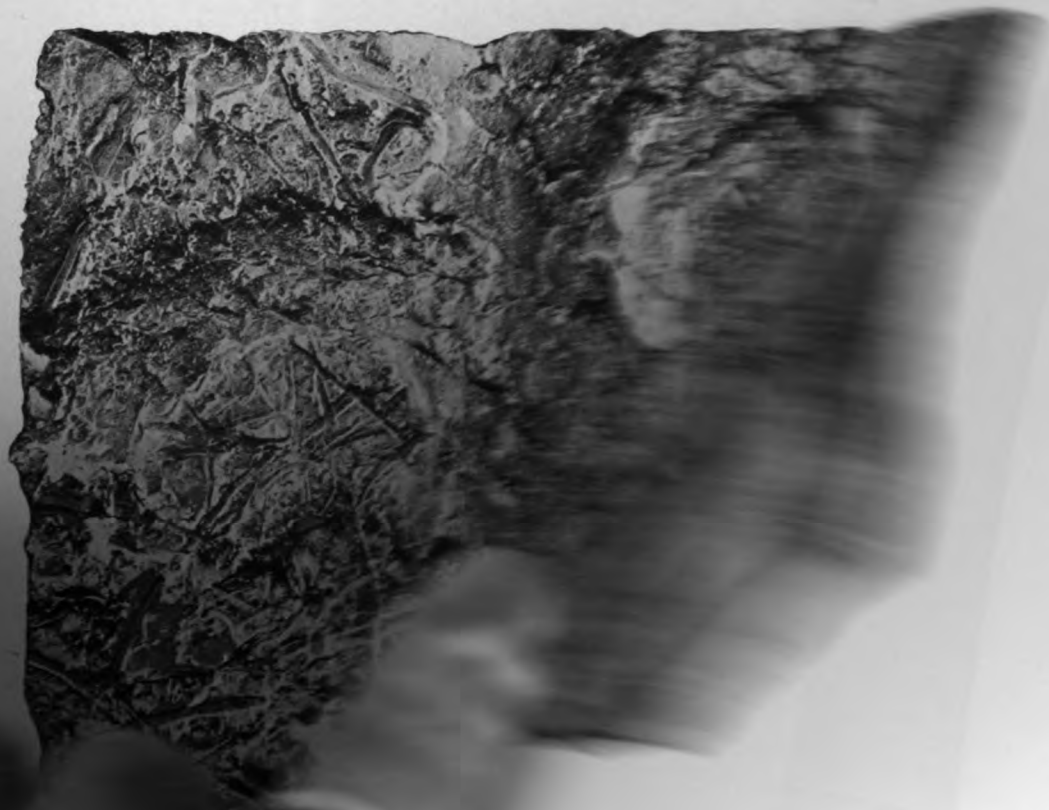

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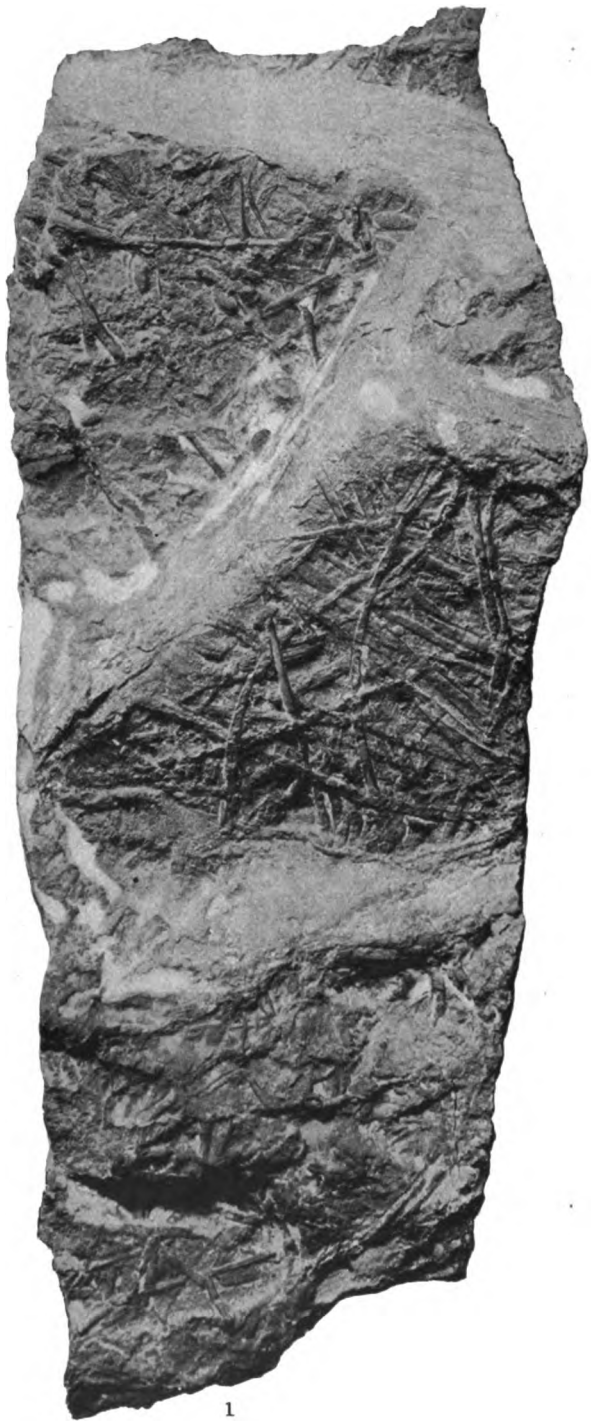

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CONIFEROUS PLANTS FROM THE TRIAS OF ARIZONA.

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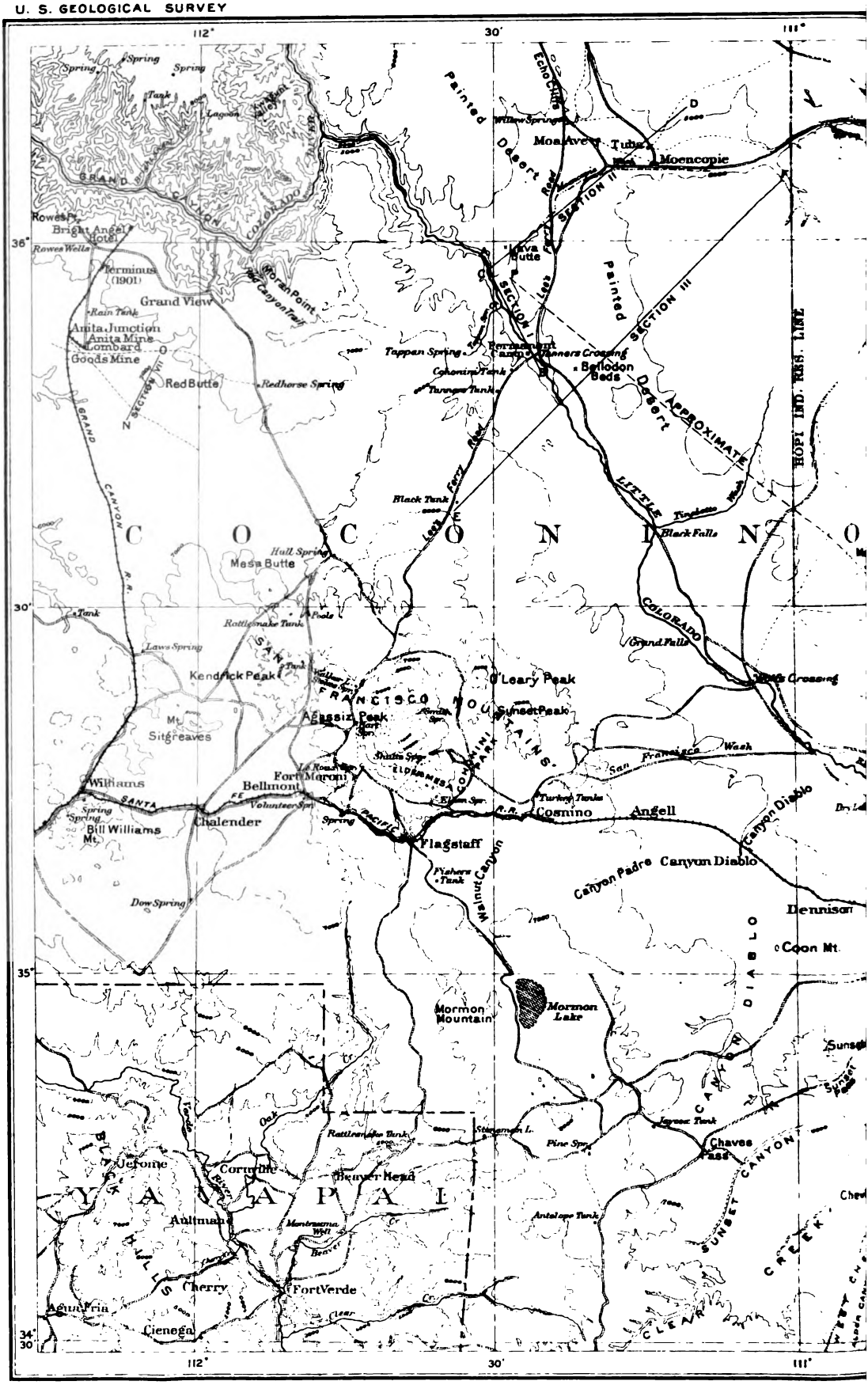

SKETCH MAP OF LITTLE COLORADO VA

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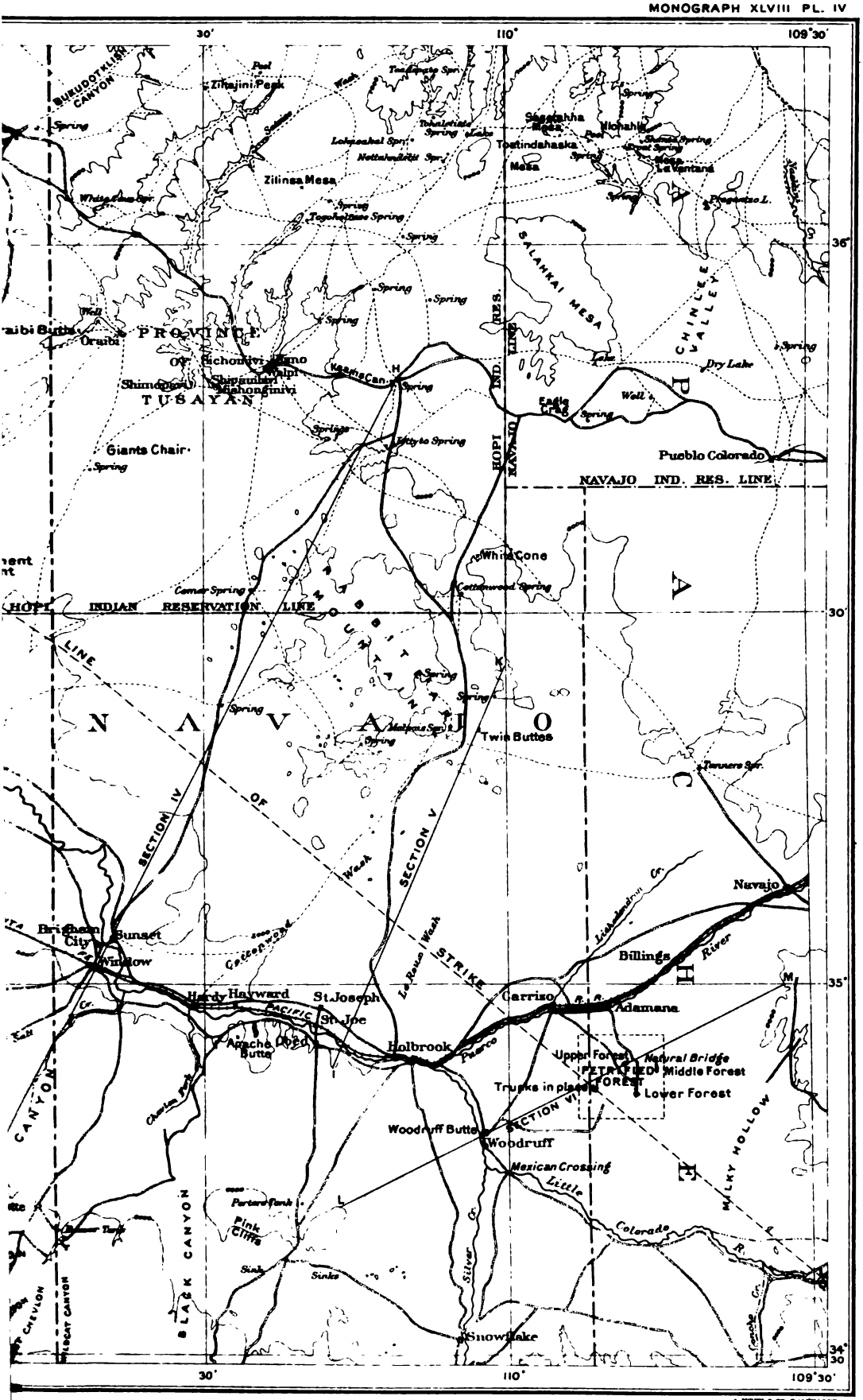

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Y. ARIZONA, AND ADJACENT REGION

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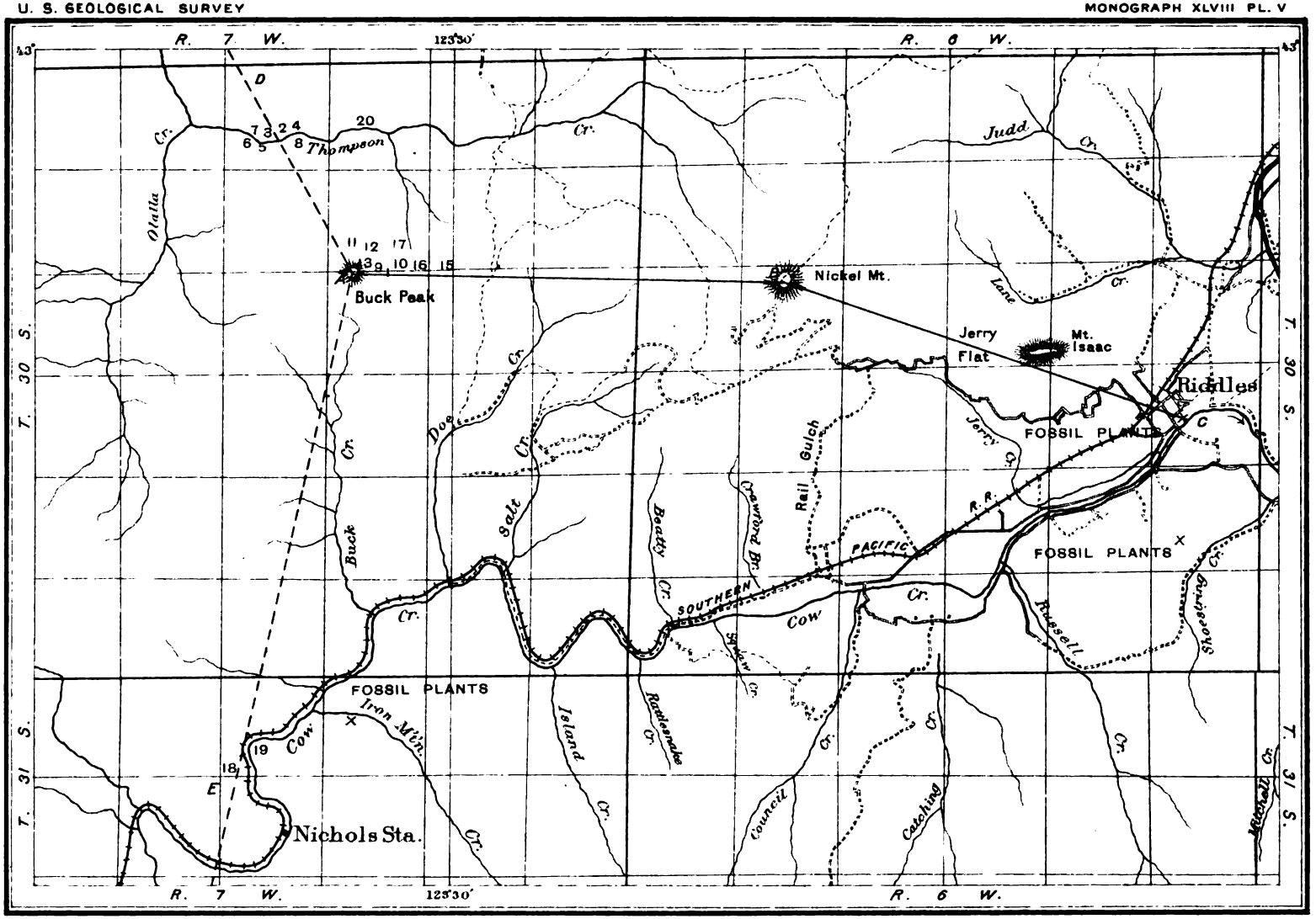

SKETCH MAP OF THE BUCK MOUNTAIN REGION AND COW CREEK VALLEY, DOUGLAS COUNTY, OREG.
showing fossil-plant localities, approximate strike of the Jurassic (*DA-AE*), and sections *AB* and *BC*

Scale
0 1 2 3 4 miles

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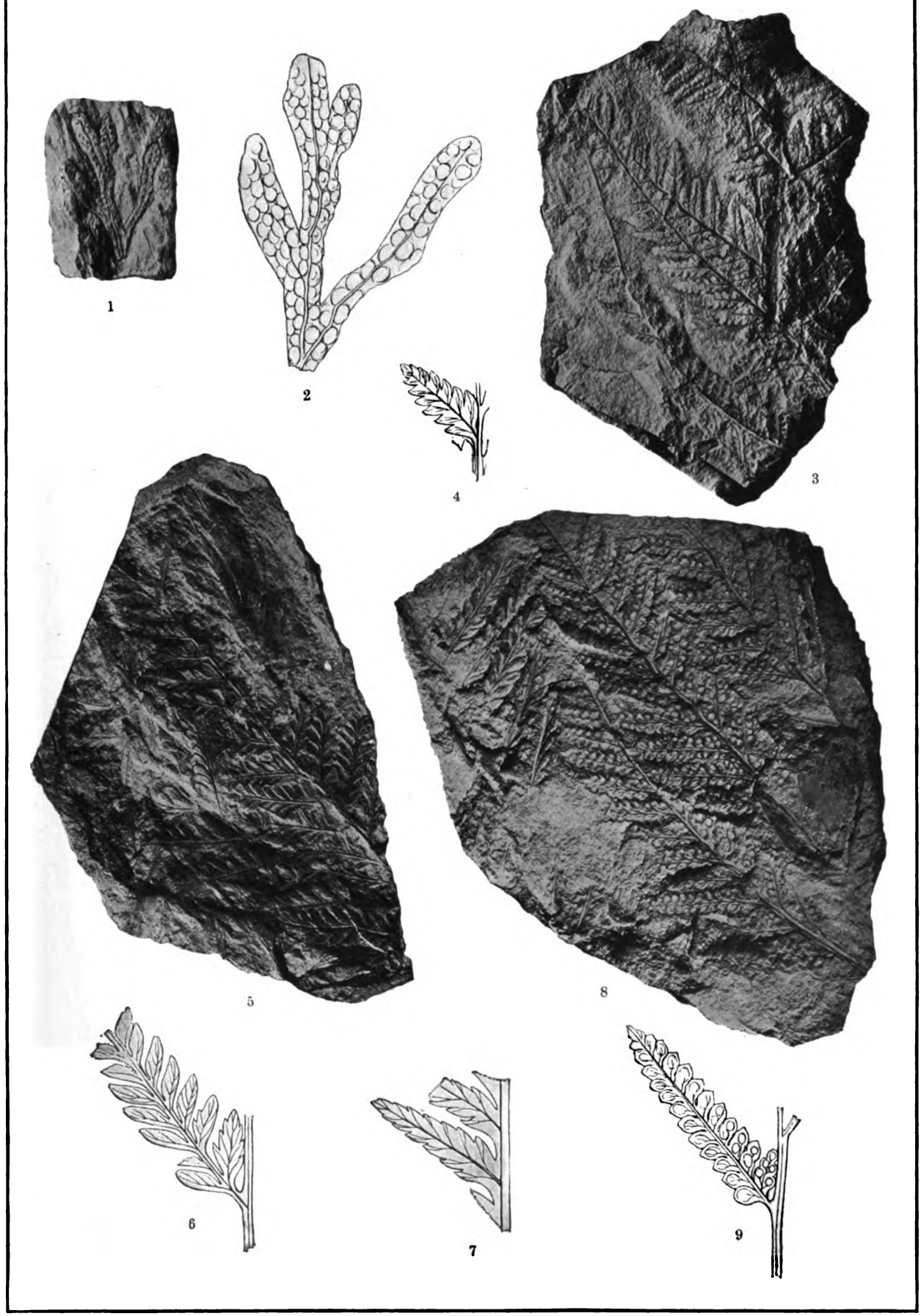

JURASSIC LIVERWORTS AND FERNS FROM OREGON.

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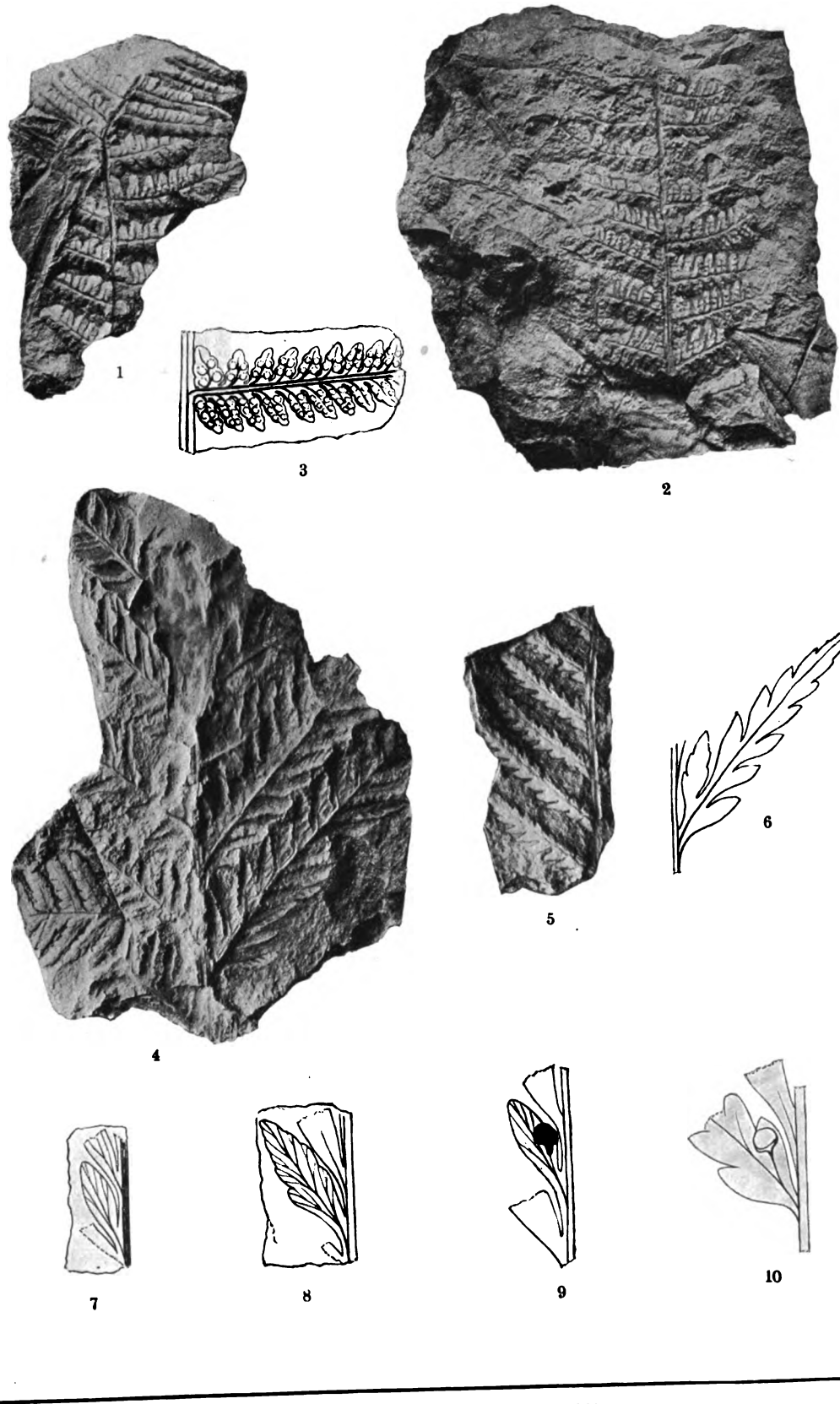

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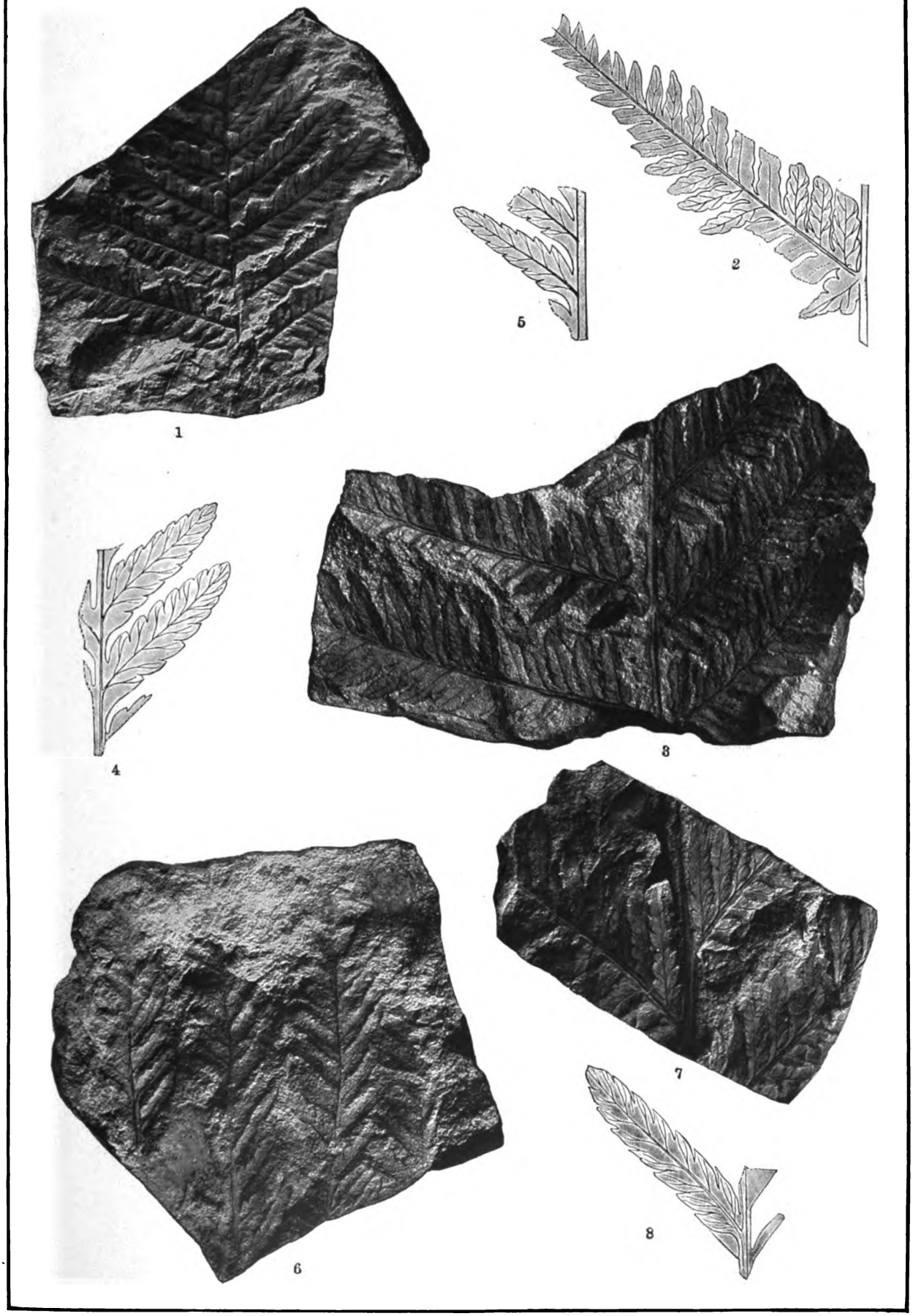

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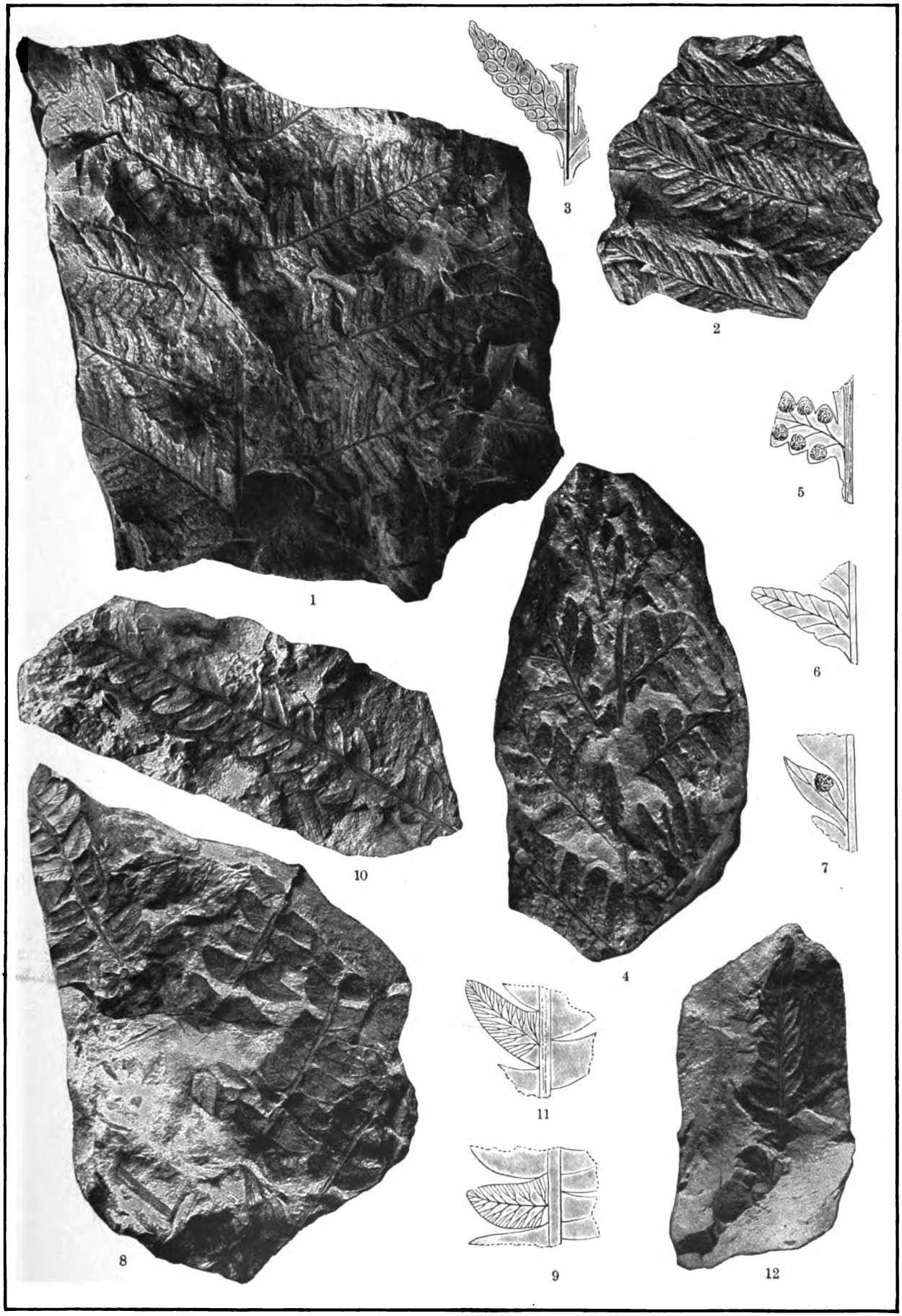

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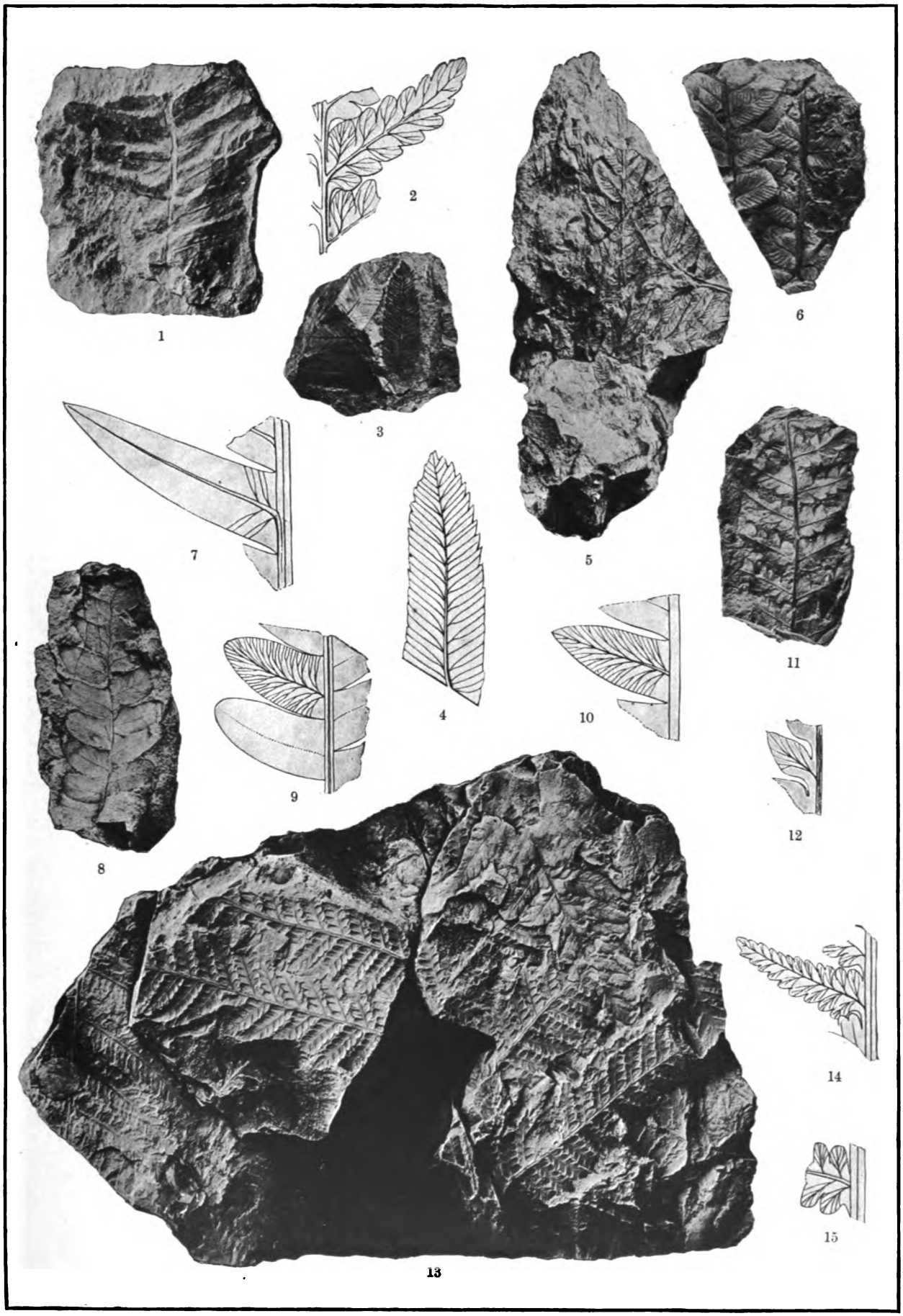

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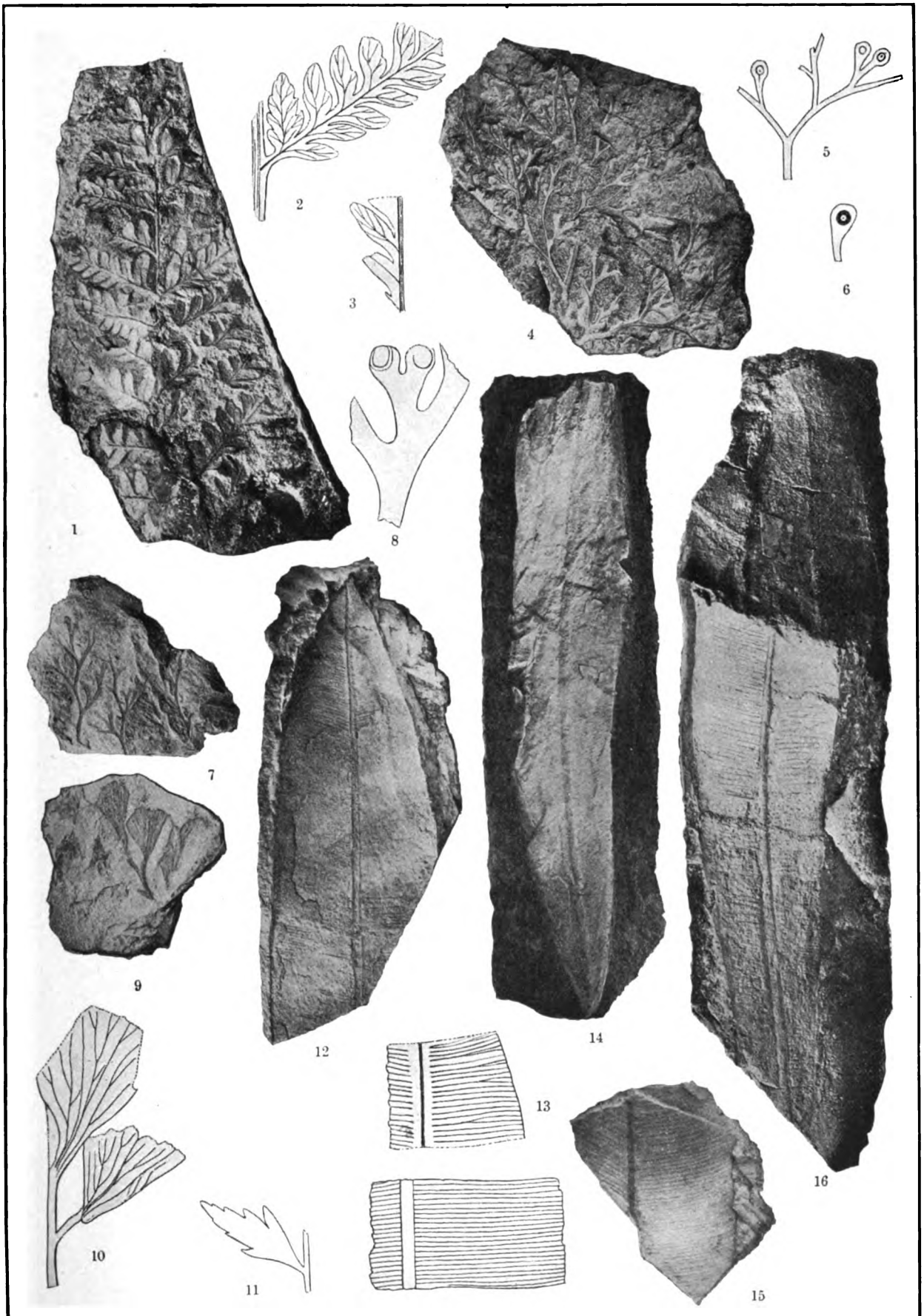

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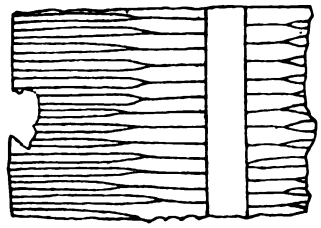

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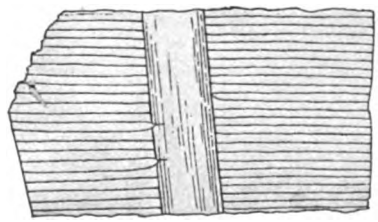

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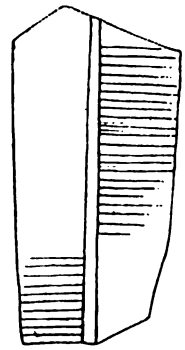

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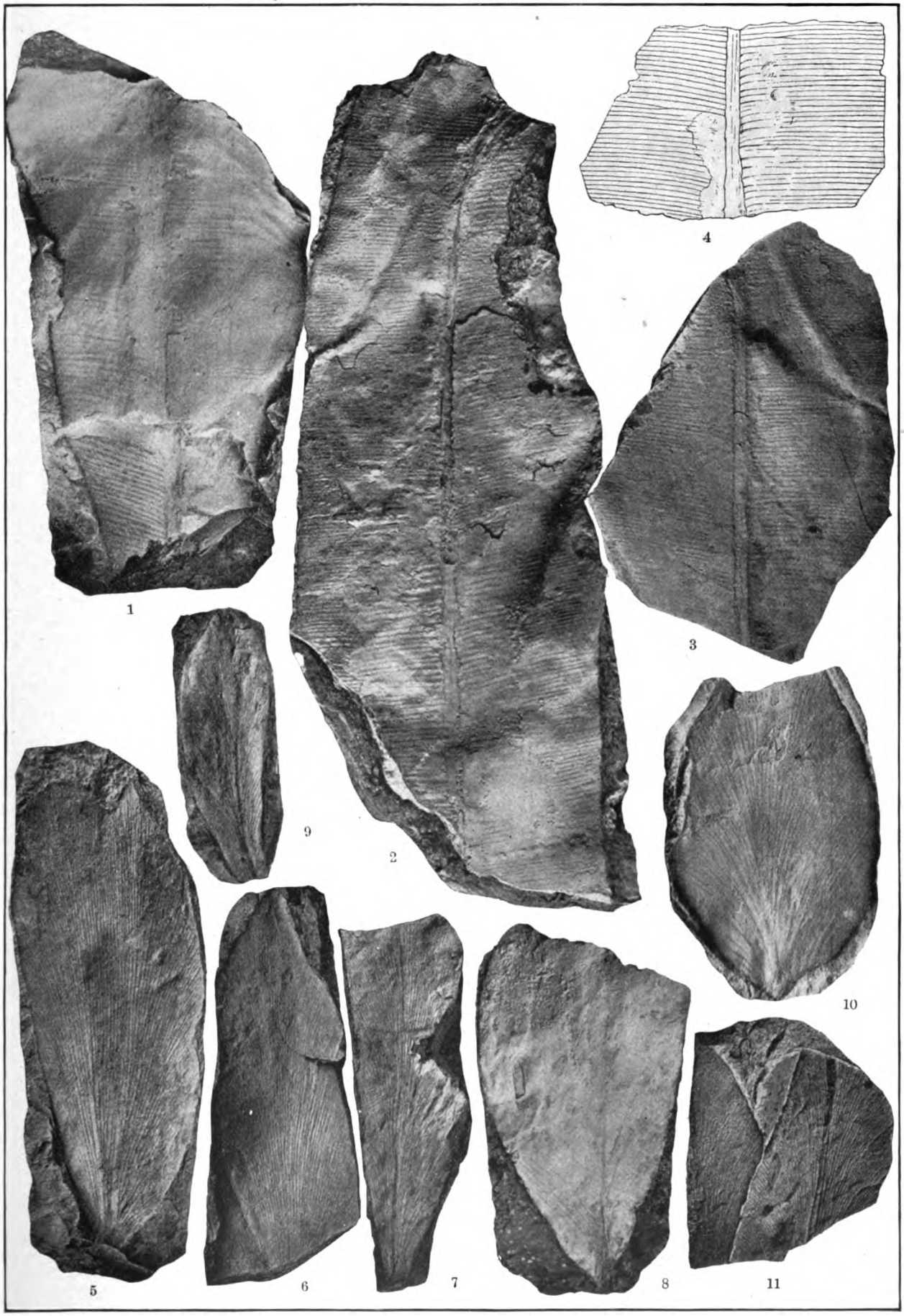

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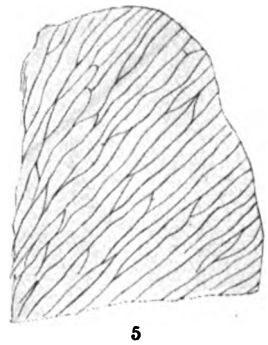
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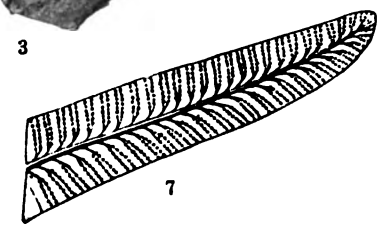
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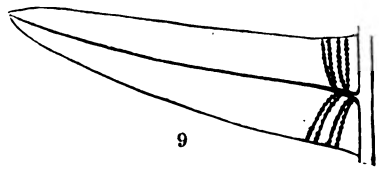
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JURASSIC FERNS AND EQUISETA FROM OREGON.

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Figs. 10–13. Nilsonia orientalis minor Font. n. var 92
Fig. 11. Summit of Fig. 10 enlarged, × 2.

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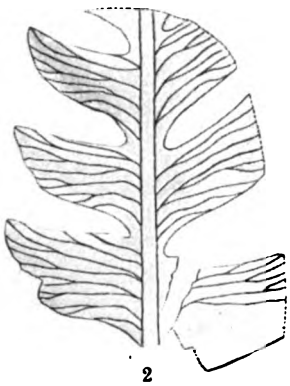
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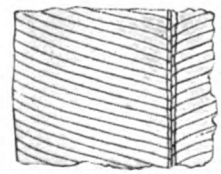
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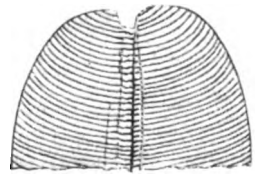
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Fig. 5. Enlarged portion of Fig. 4, × 3.

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FIGS. 8–10. NILSONIA NIPPONENSIS Yok. 94

Fig. 9. Pen drawing of a portion of Fig. 8, natural size.

FIGS. 11–14. NILSONIA COMPTA (Phill.) Göpp. 94

Fig. 12. Enlarged portion of Fig. 11, × 3.

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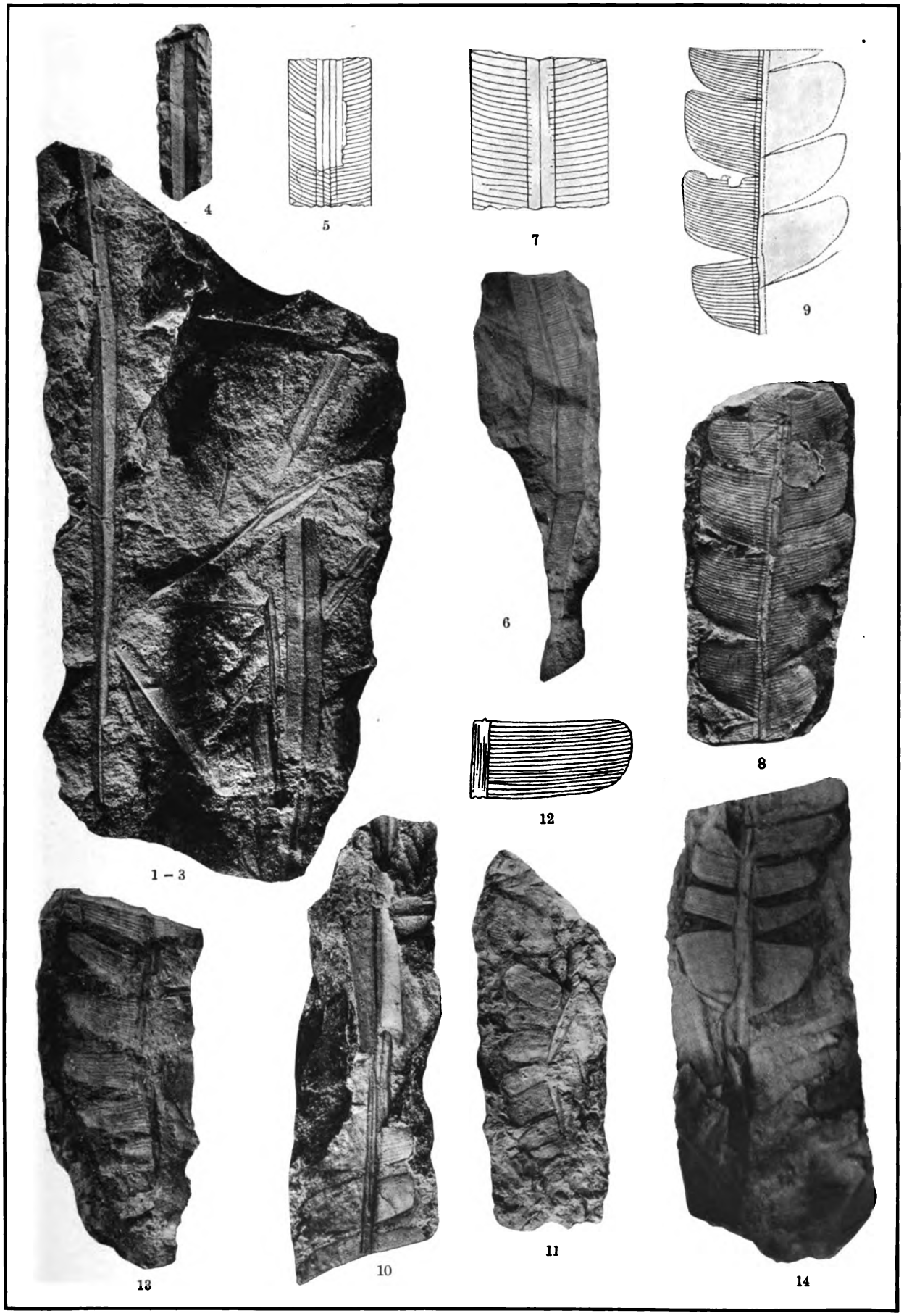

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Fig. 3. Enlarged portion of Fig. 2, × 2.

Fig. 6. Enlarged pinna of Fig. 5, × ¾.

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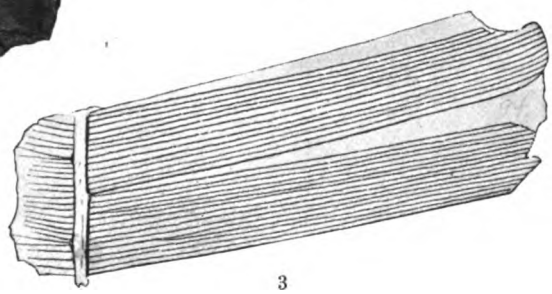

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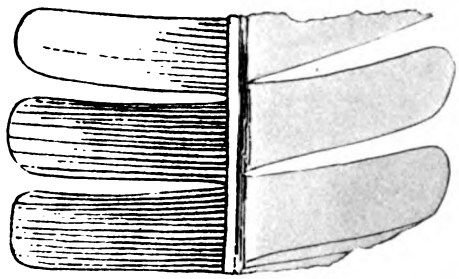

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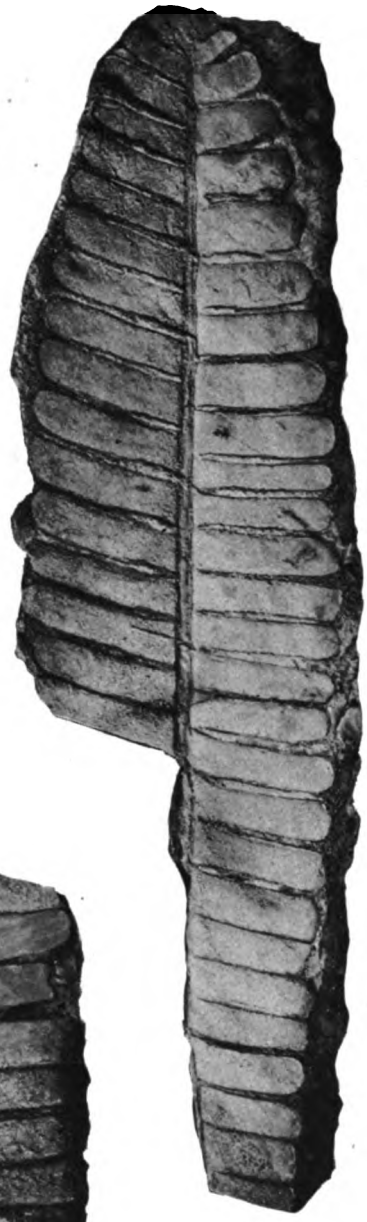

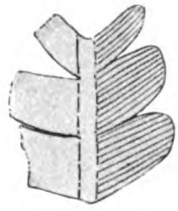

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FIGS. 1–5. CTENOPHYLLUM ANGUSTIFOLIUM Font..... 105

Fig. 3. Enlarged portion of Fig. 2, × ½.

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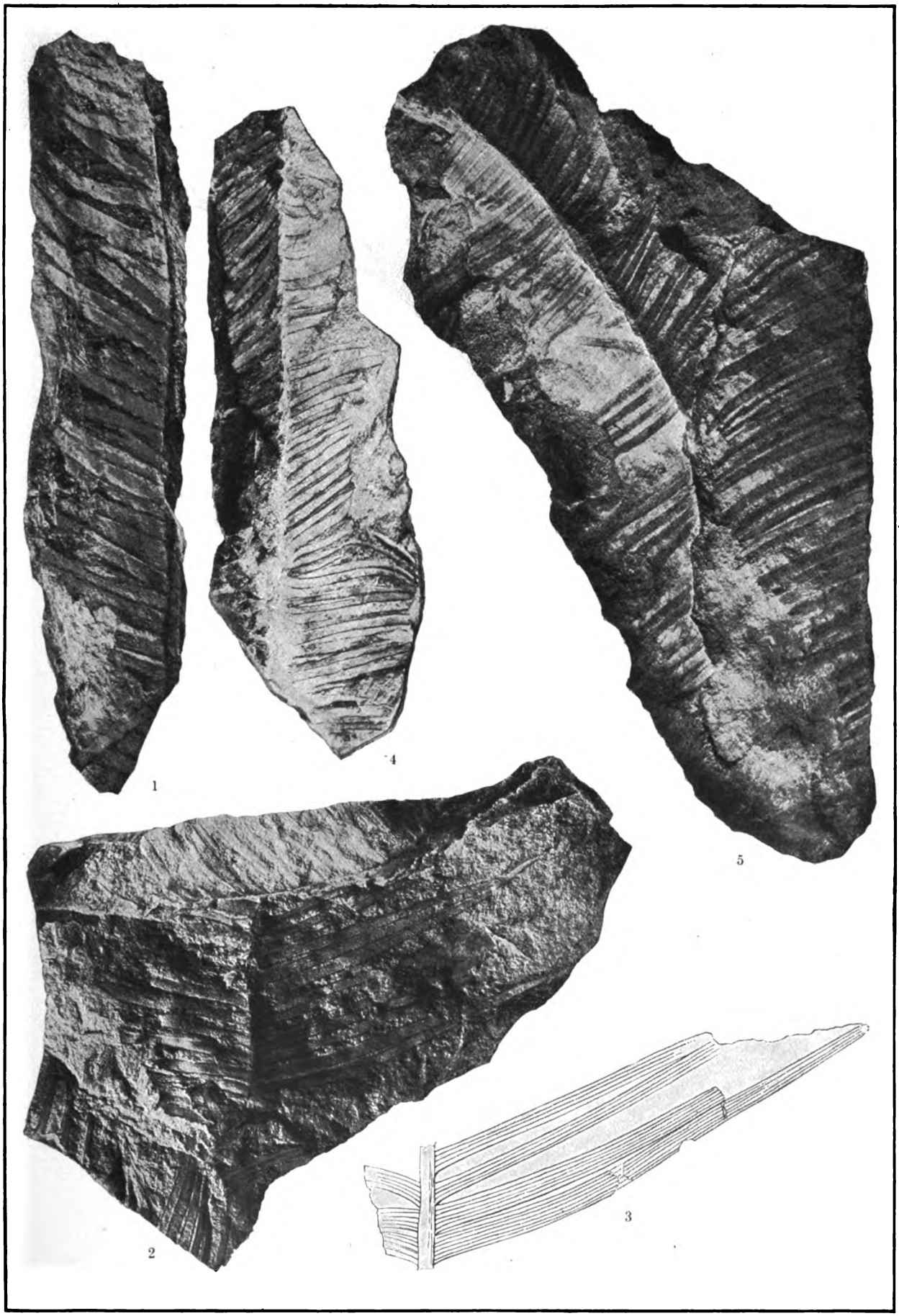

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Fig. 4. Enlarged portion of Fig. 3, × 2.

FIGS. 5–12. CTENOPHYLLUM WARDII Font..... 107

Figs. 6, 7. Enlarged portions of Fig. 5, × $\frac{3}{2}$.

Fig. 12. Pen drawing of Fig. 11, natural size.

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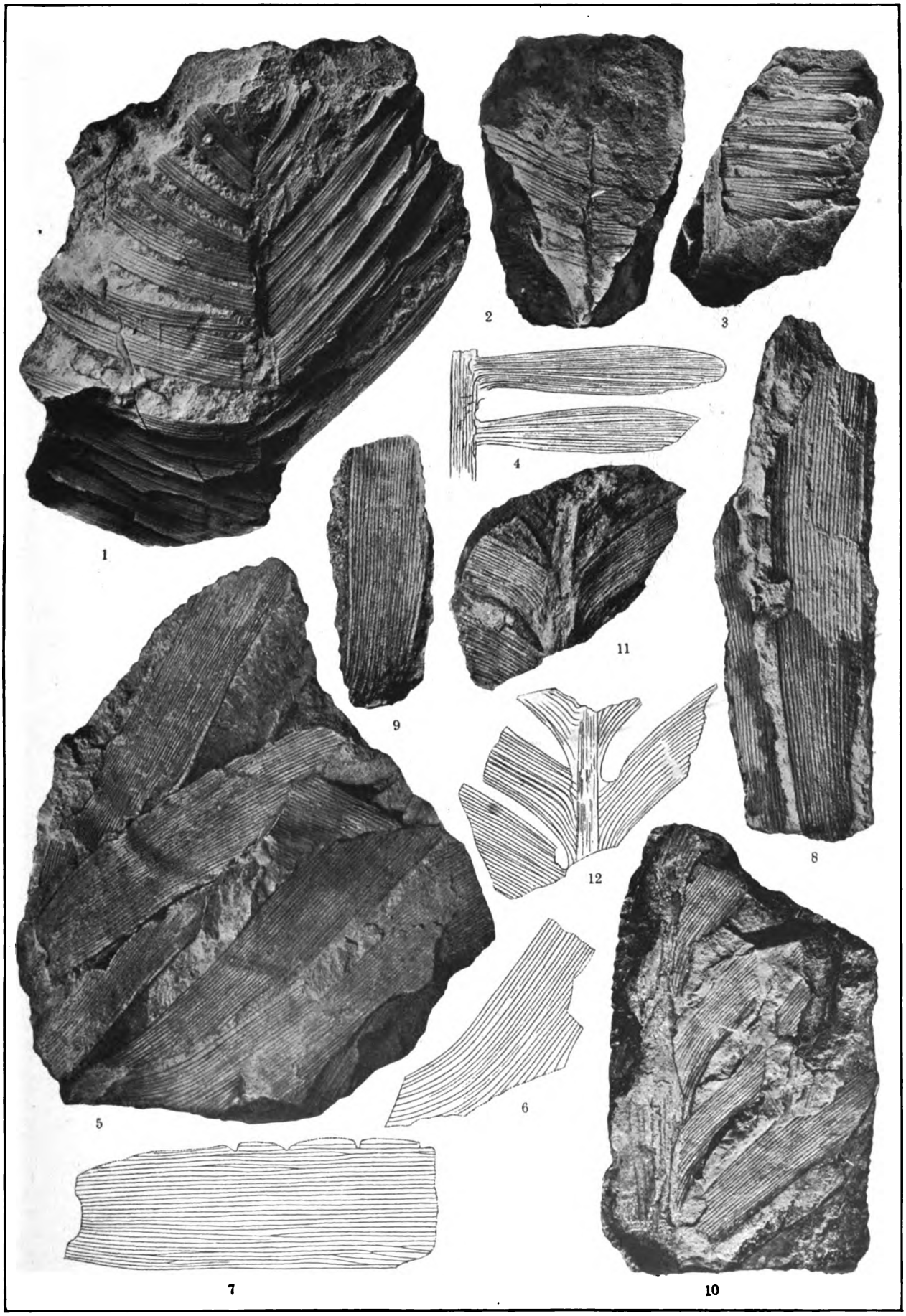

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FIGS. 1–10. PODOZAMITES PULCHELLUS Heer 108

Fig. 2. Enlargement of Fig. 1, × 2.

Fig. 4. Enlargement of Fig. 3, × ½.

Fig. 9. Enlargement of Fig. 8, × 2.

FIGS. 11–16. PODOZAMITES PACHYPHYLLUS Font. n. sp. 109

Fig. 15. Enlargement of Fig. 14, × ½.

FIGS. 17–20. PODOZAMITES LANCEOLATUS (L. & H.) Fr. Br. 110

Fig. 20. Pen drawing of Fig. 19, natural size.

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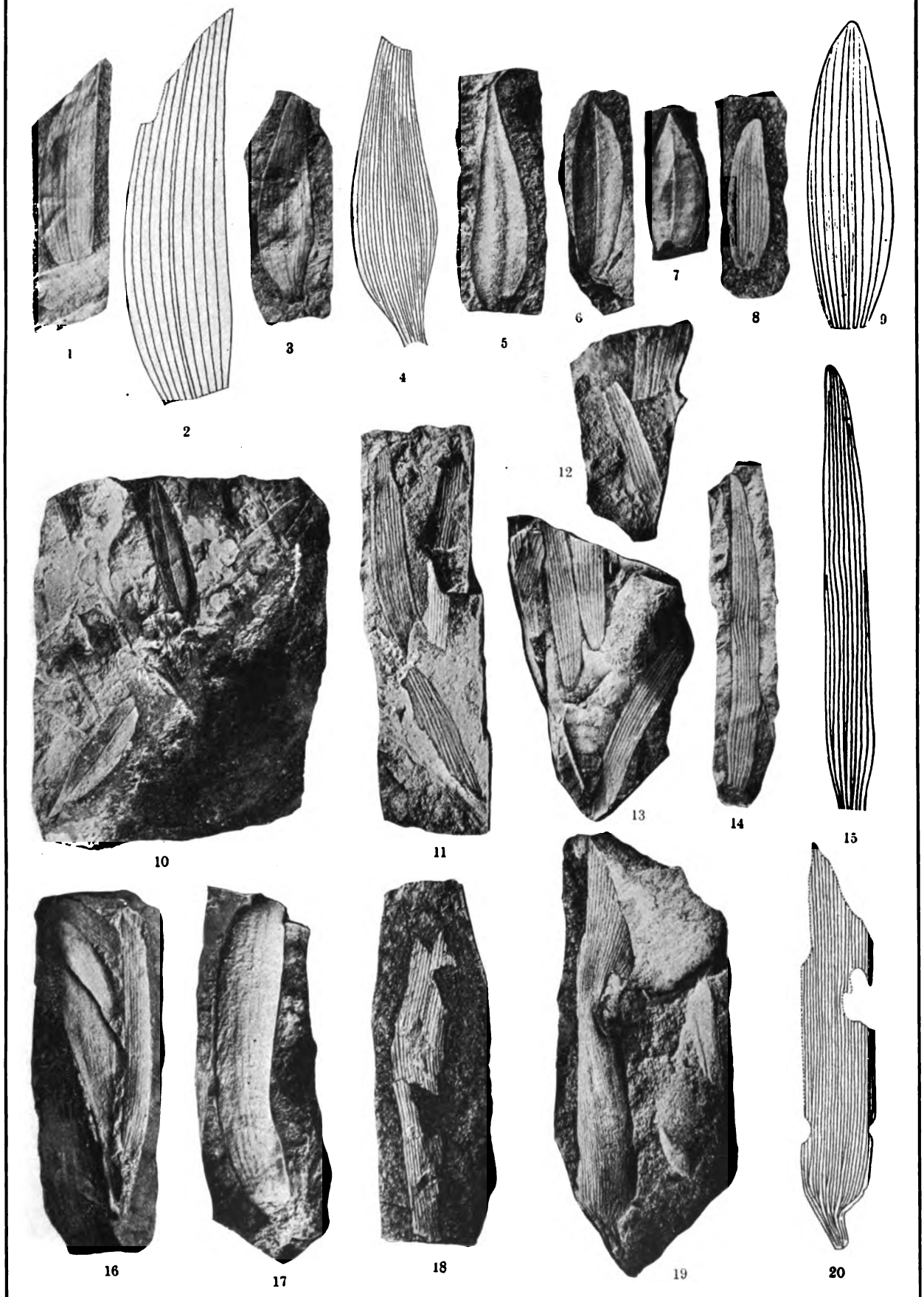

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Fig. 6. Enlargement of Fig. 5, × $\frac{4}{2}$.
Fig. 8. Podozamites ? pachynervis Font. n. sp 112
Fig. 9. Ctenis sulcicaulis (Phill.) Ward n. comb 113

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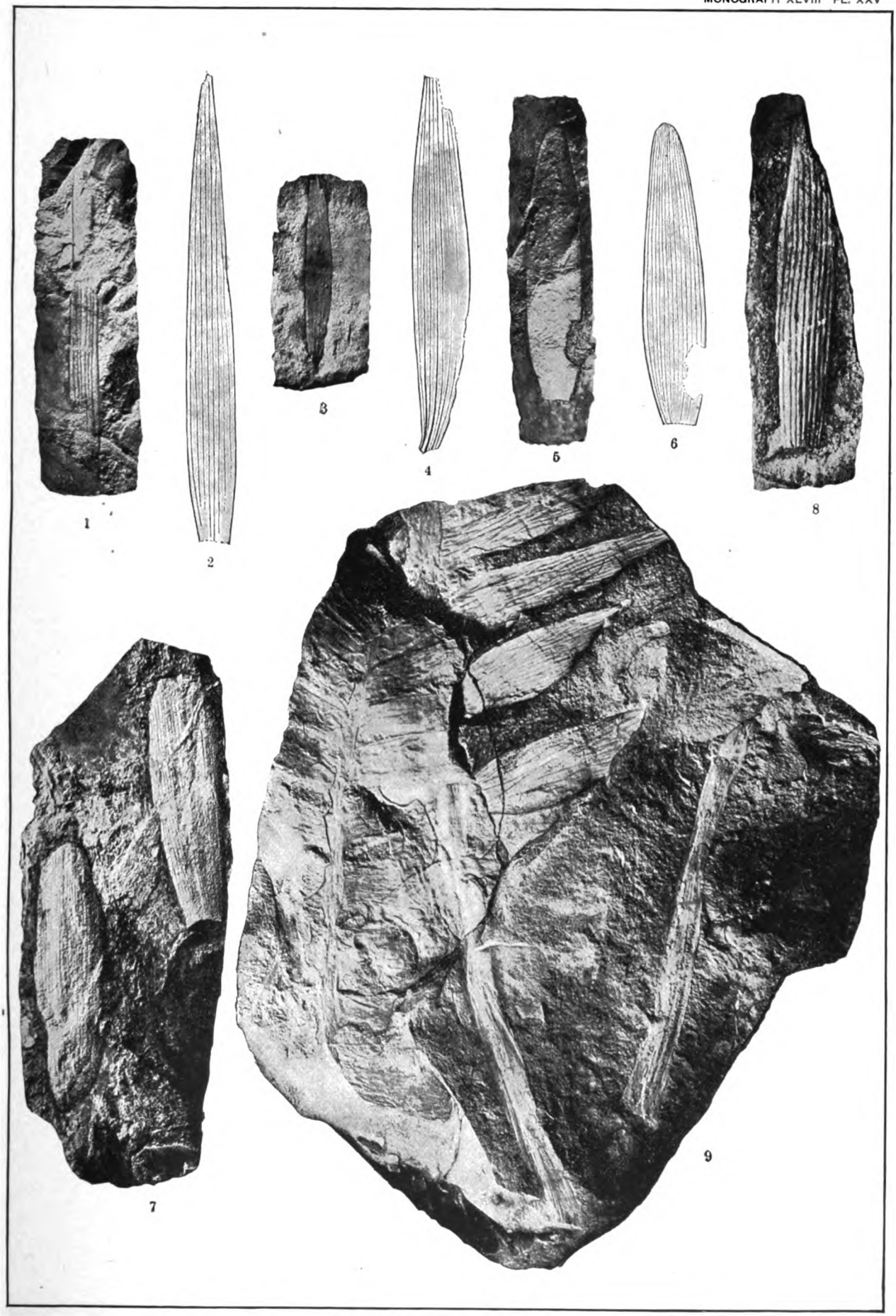

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FIGS. 1-6. CTENIS SULCICAULIS (Phill.) Ward n. comb. 113

Fig. 2. Enlargement of Fig. 1, × $\frac{4}{2}$.

Fig. 6. Enlargement of Fig. 5, × $\frac{3}{2}$.

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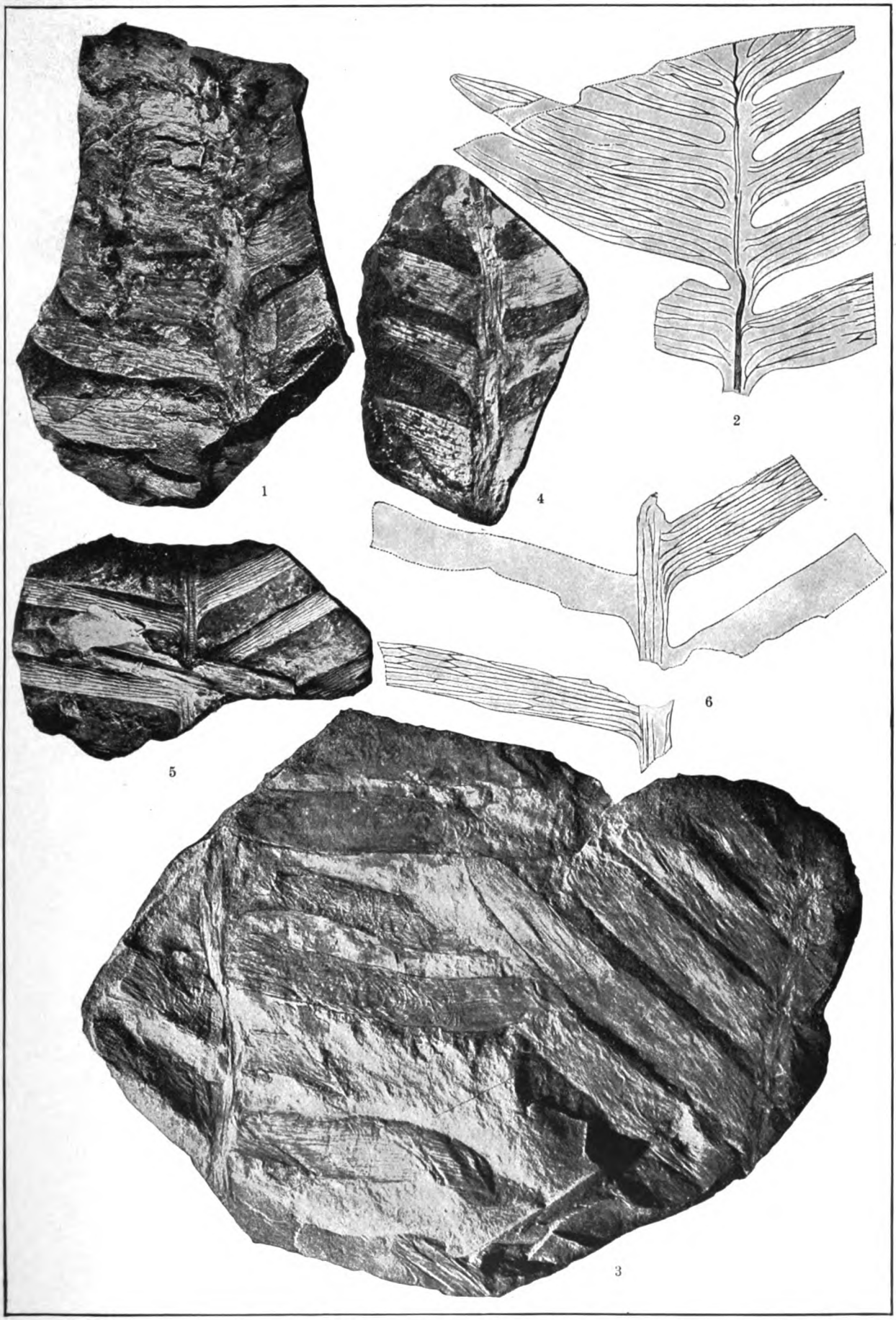

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Figs. 1–5. Ctenis orovillensis Font..... 115

Fig. 2. Fragment of a leaflet of Fig. 1, natural size.

Fig. 4. Pen drawing of Fig. 3, natural size.

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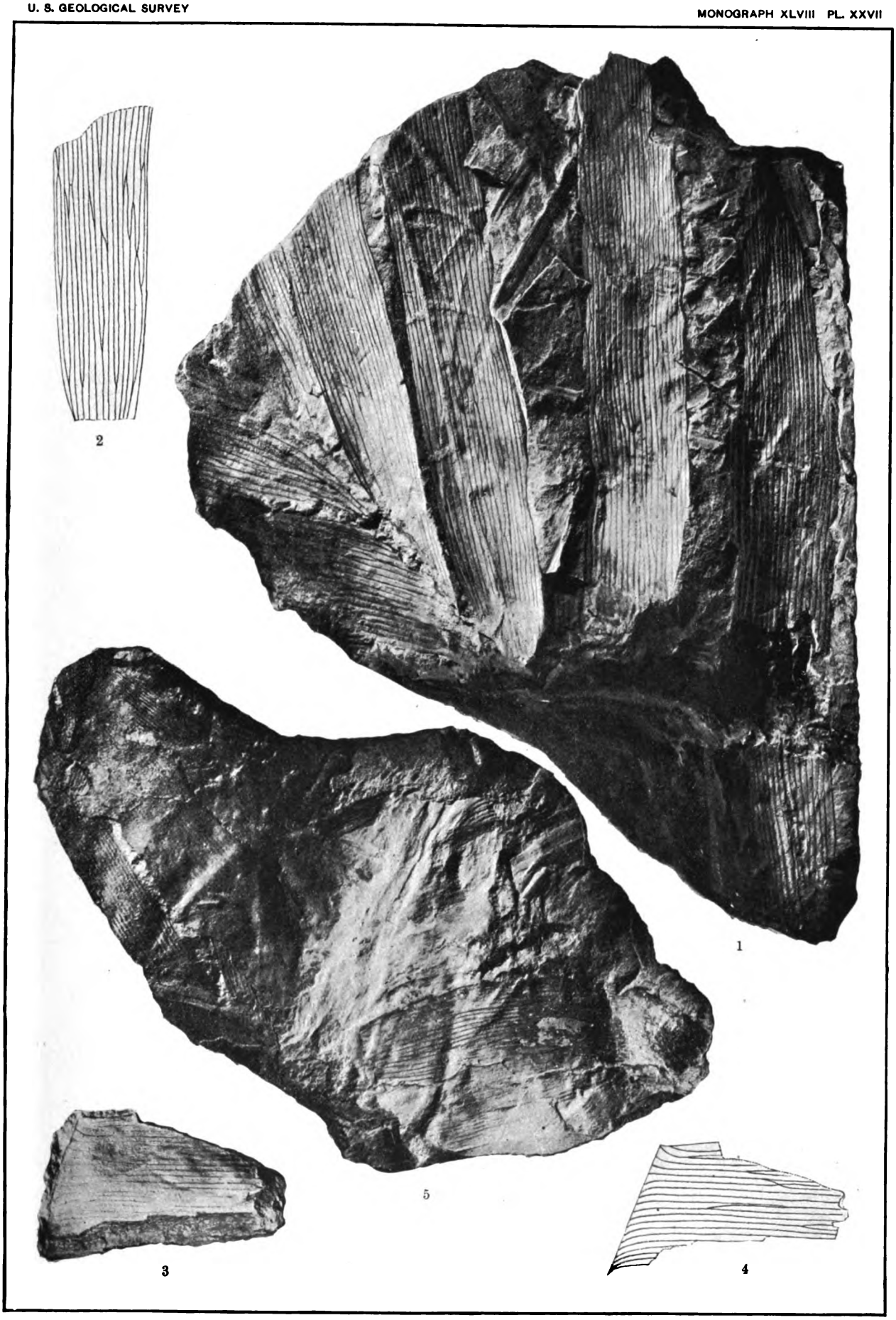

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Figs. 2–8. Ctenis grandifolia Font. 116

Fig. 4. Portion of Fig. 3 showing nervation, natural size.

Fig. 6. Basal part of Fig. 5, natural size.

Fig. 8. Pen drawing of Fig. 7 better to show the nervation, natural size.

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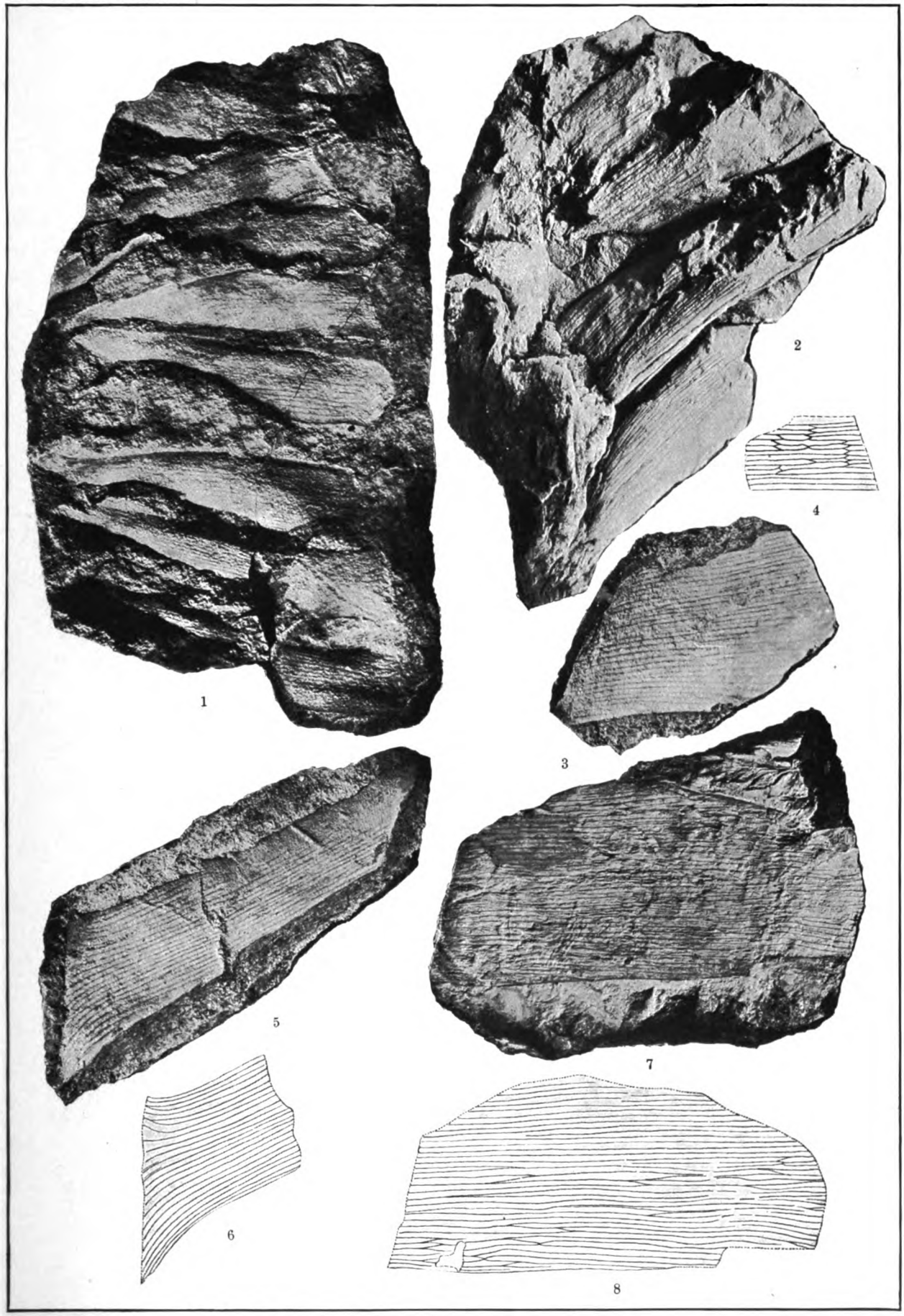

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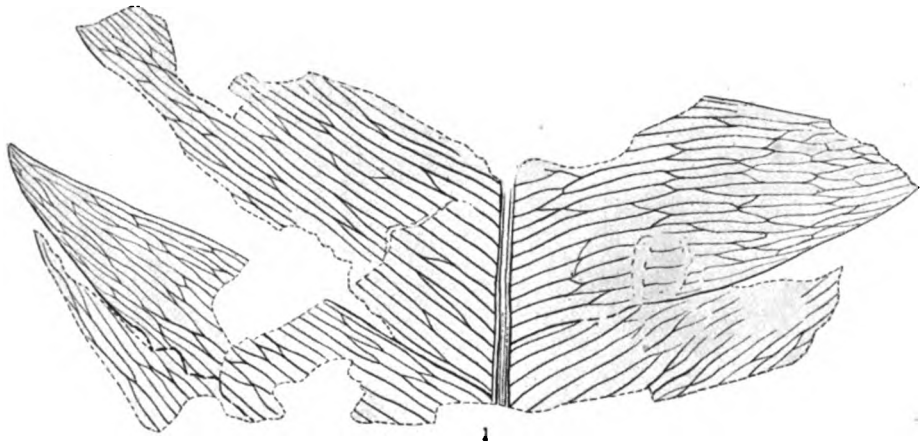
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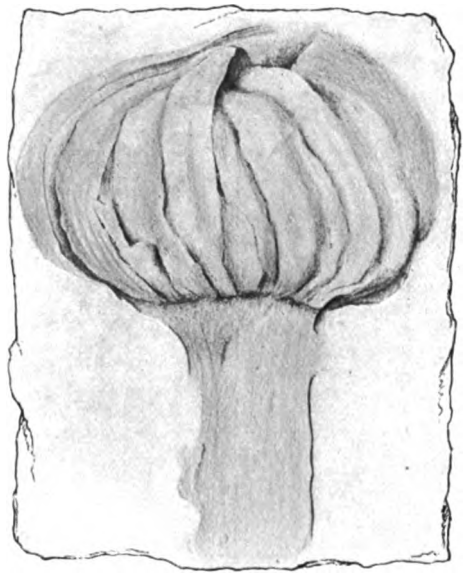
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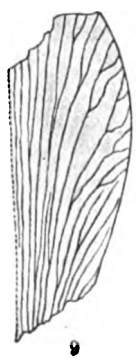
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Fig. 2. Pen drawing of part of Fig. 1 to show nervation, natural size.

Fig. 5. Pen drawing of Fig. 4, natural size.

Fig. 7. Pen drawing of Fig. 6, natural size.

FIGS. 8–12. GINKGO HUTTONI (Sternb.) Heer..... 123

Fig. 9. Pen drawing of Fig. 8, natural size.

Fig. 11. Pen drawing of Fig. 10, natural size.

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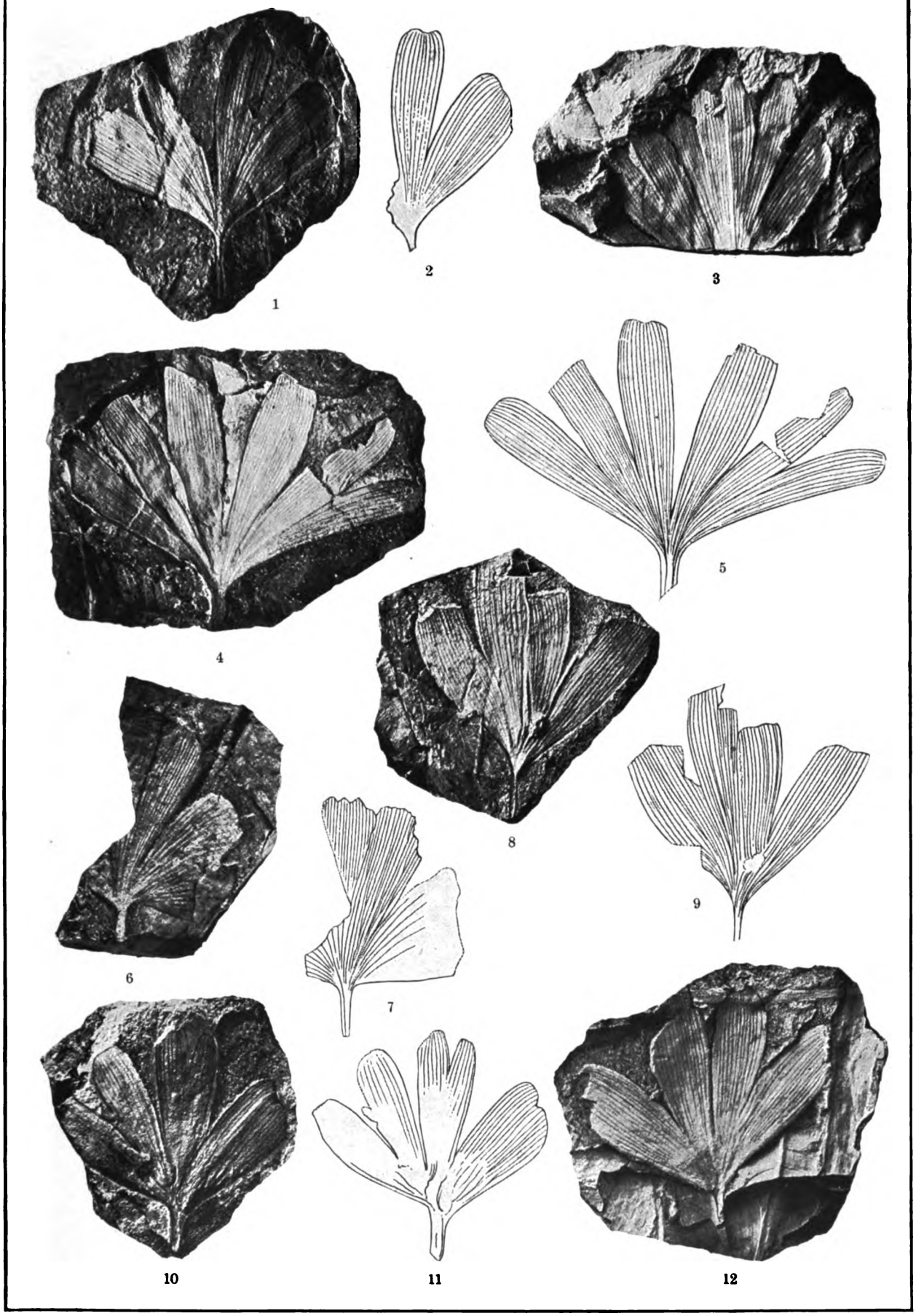

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FIGS. 1–3. GINKGO HUTTONI (Sternb.) Heer 123

Fig. 3. Pen drawing of Fig. 2, natural size.

FIGS. 4–8. GINKGO HUTTONI MAGNIFOLIA Font. n. var. 124

Fig. 5. Pen drawing of a portion of Fig. 4, natural size.

Fig. 7. Pen drawing of a portion of Fig. 6, natural size.

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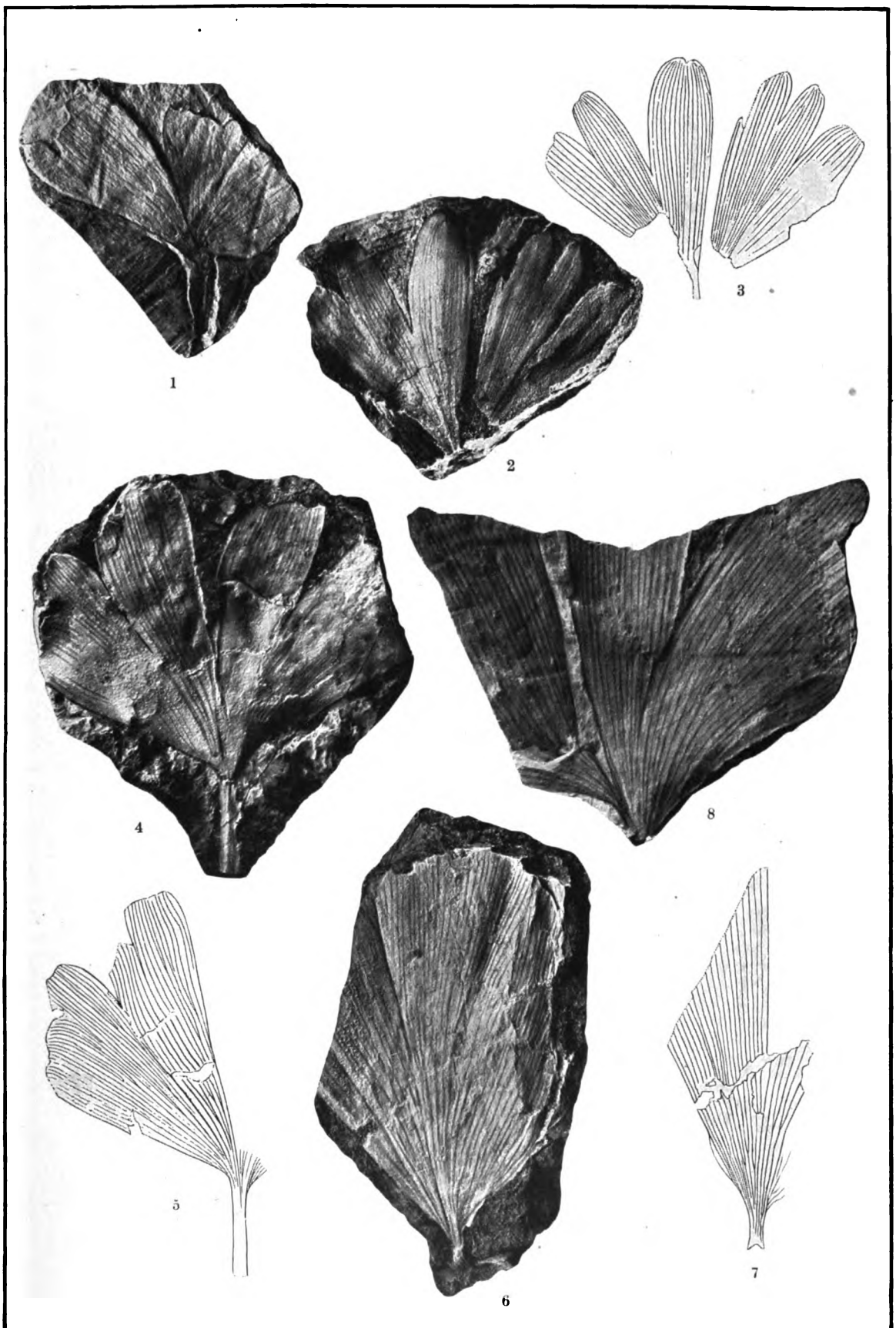

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Figs. 1, 2. Ginkgo Huttoni magnifolia Font. n. var. 124

Fig. 2. Pen drawing of Fig. 1, natural size.

Figs. 3–8. Ginkgo lepida Heer. 125

Fig. 4. Pen drawing of Fig. 3, natural size.

Fig. 7. Enlargement of Fig. 6, × $\frac{3}{2}$.

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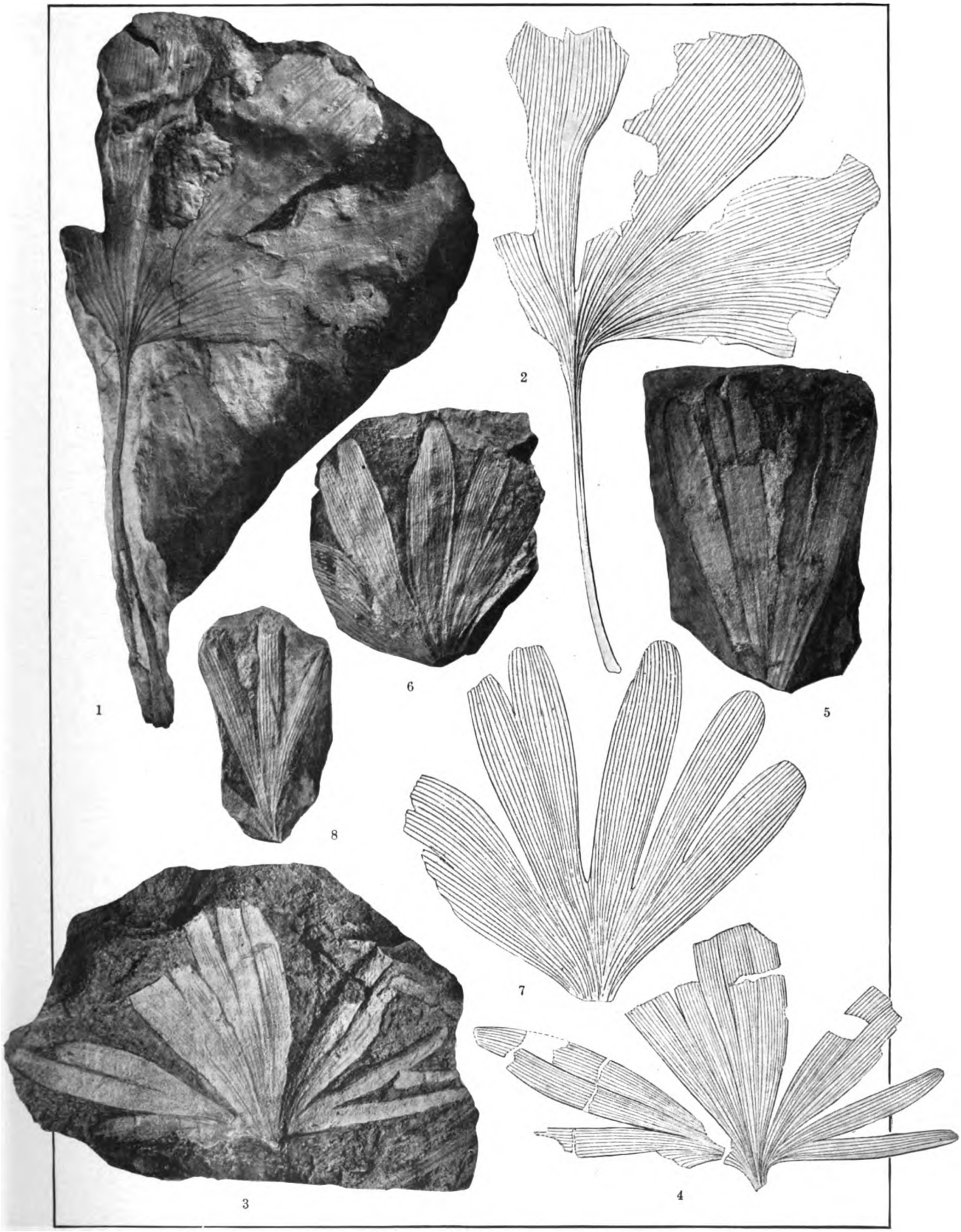

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Fig. 4. Enlargement of Fig. 3, × 4/3.

Fig. 6. Enlargement of Fig. 5, × 4/3.

Fig. 10. Enlargement of Fig. 9, × 3/2.

Fig. 13. Enlargement of Fig. 12, × 2.

Fig. 15. Enlargement of Fig. 14, × 2.

Fig. 17. Enlargement of Fig. 16, × 2.

Fig. 19. Enlargement of Fig. 18, × 2.

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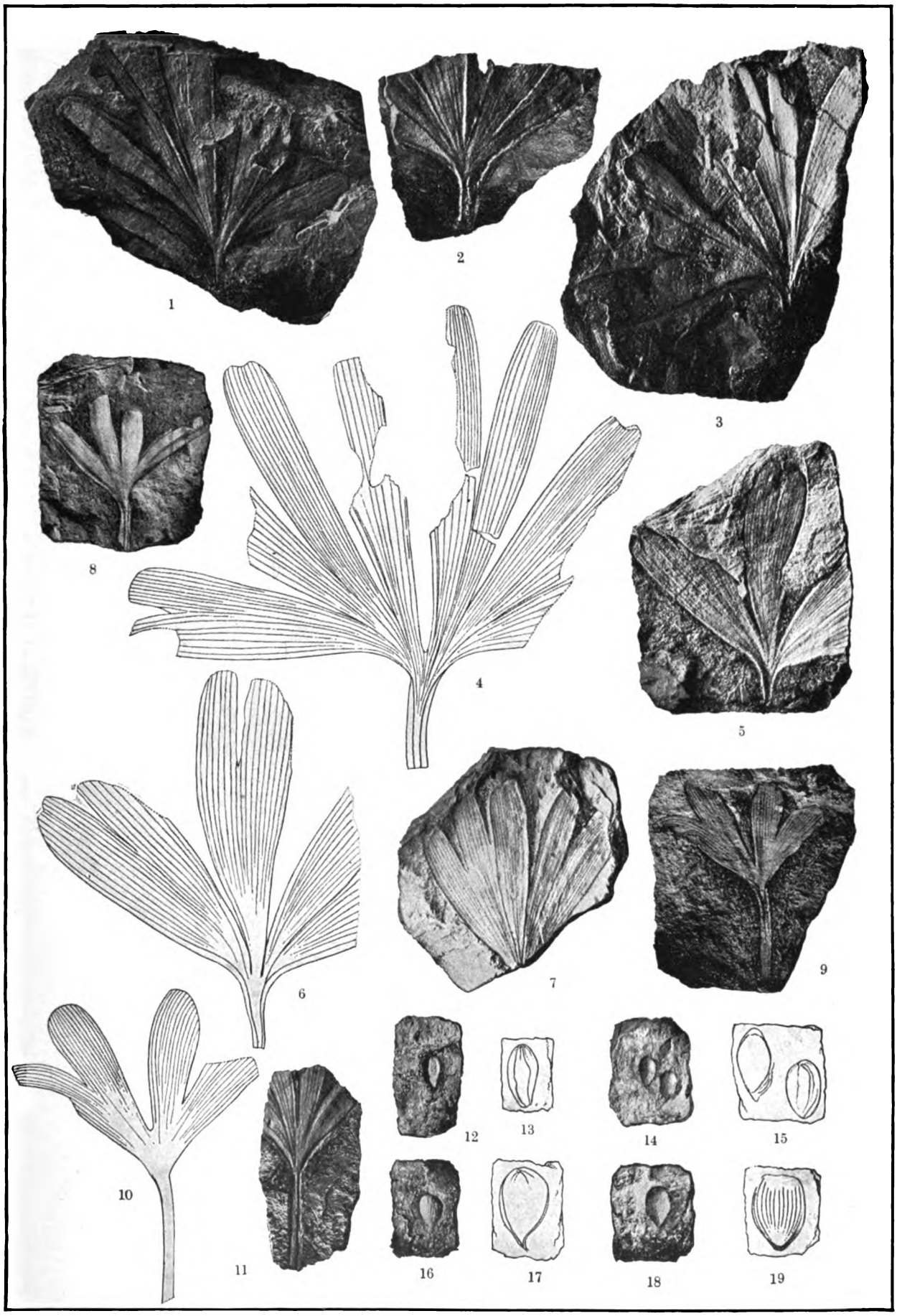

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FIGS. 1–12. GINKGO sp. Font., aberrant forms of leaves 127

Fig. 2. Enlargement of Fig. 1, × 2.

Fig. 4. Enlargement of Fig. 3, × 2.

Fig. 6. Enlargement of Fig. 5, × 2.

Fig. 8. Enlargement of Fig. 7, × 2.

Fig. 10. Enlargement of Fig. 9, × 2.

Fig. 12. Enlargement of Fig. 11, × 2.

FIGS. 13, 14. PHŒNICOPSIS ? sp. Font 128

Fig. 14. Pen drawing of Fig. 13, natural size.

FIGS. 15–17. TAXITES ZAMIOIDES (Leck.) Sew 129

Fig. 16. Enlargement of Fig. 15.

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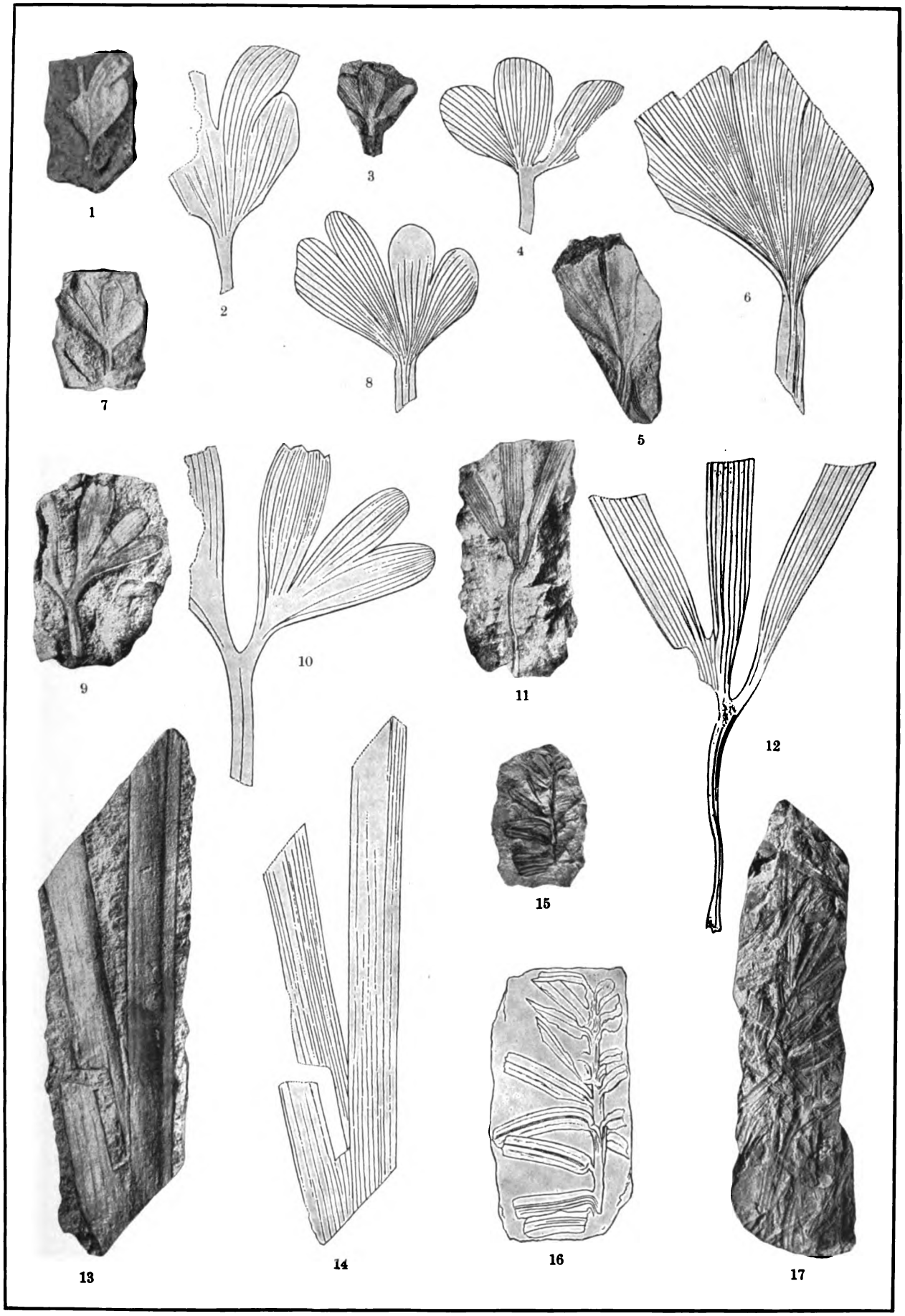

JURASSIC GINGKOACEÆ AND TAXACEÆ FROM OREGON.

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	Fig. 15. Pen drawing of one of the leaves shown in Fig. 14, natural size.	
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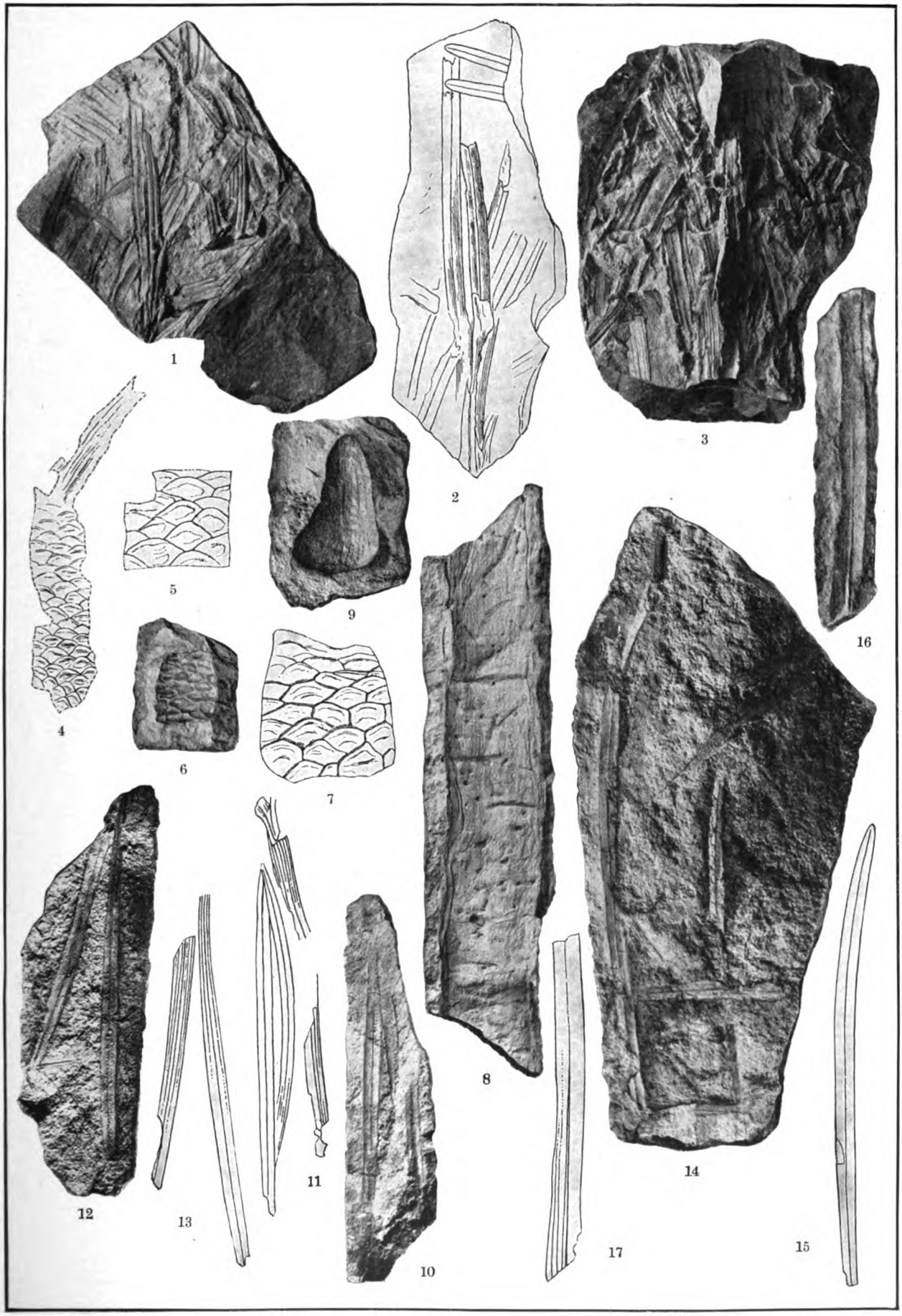

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FIGS. 1, 2. CYCLOPITYS OREGONENSIS Font. n. sp. 132

Fig. 2. Enlargement of Fig. 1, × $\frac{3}{2}$.

FIGS. 3–8. SPHENOLEPIDIUM OREGONENSE Font. n. sp. 133

Fig. 4. Enlargement of Fig. 3, × 2.

Fig. 7. Enlargement of the principal branch shown in Fig. 6, × 2.

Fig. 8. Enlargement of the cone and twig to which attached shown in Fig. 6, × 2.

FIGS. 9–12. SAMAROPSIS ? OREGONENSIS Font. n. sp. 134

Fig. 10. Enlargement of Fig. 9, × 3.

Fig. 12. Enlargement of Fig. 11, × 3.

FIG. 13. Male ament of conifer 135

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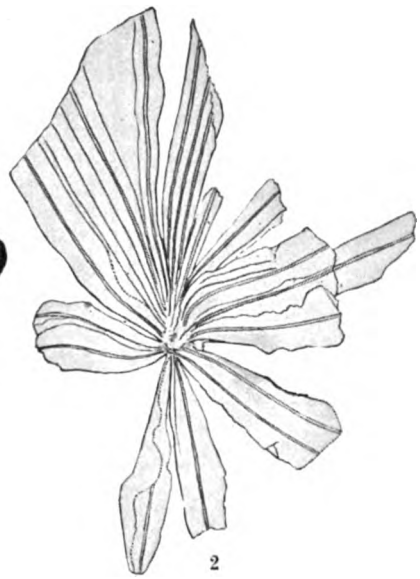

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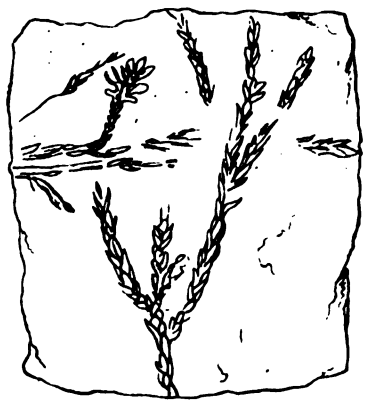

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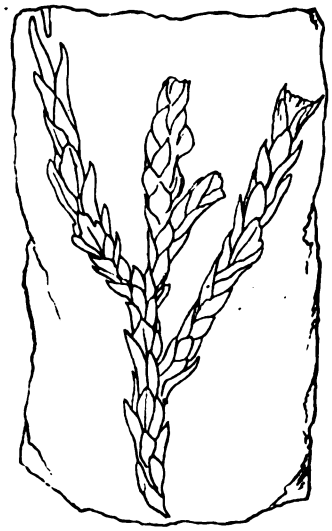

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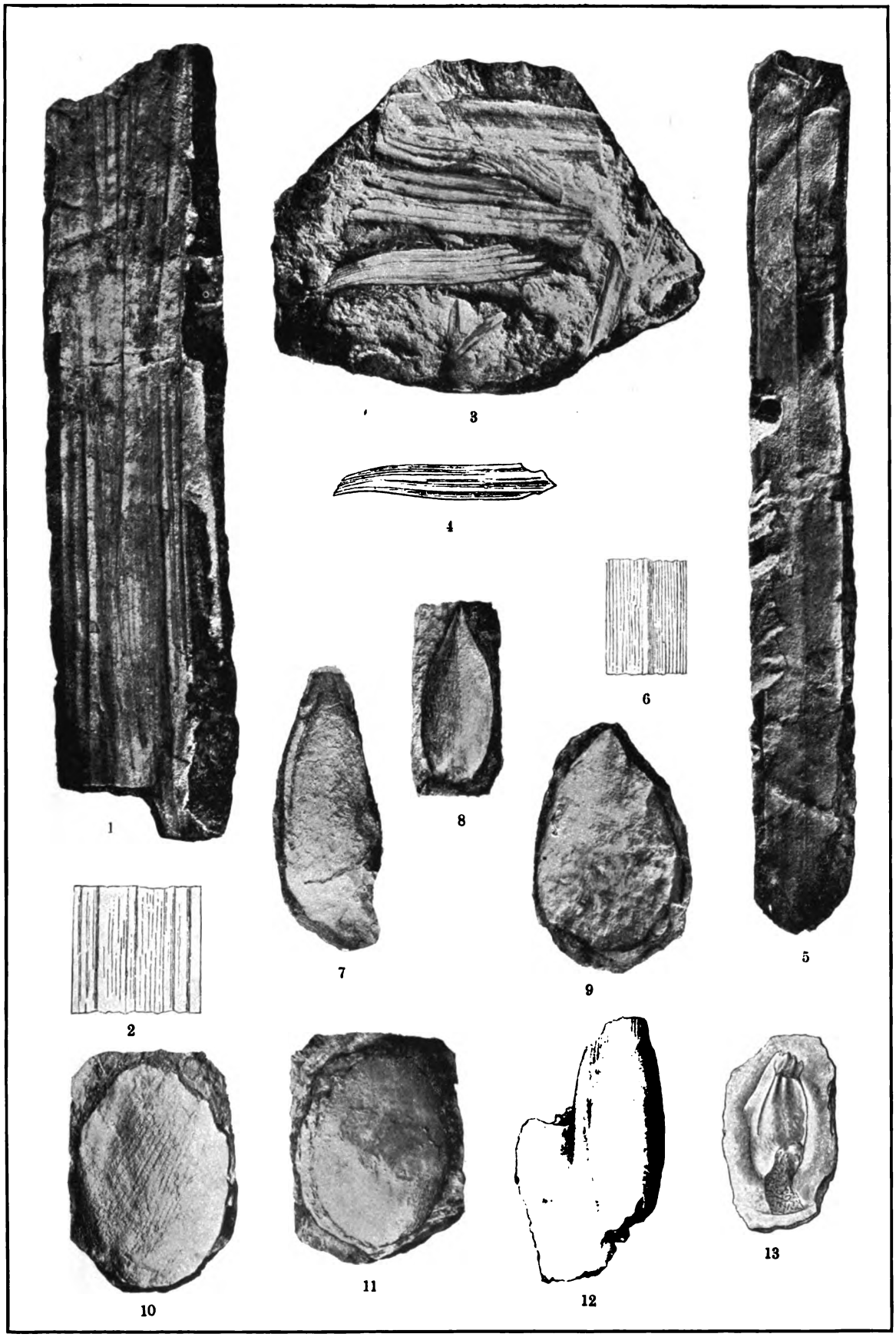

MISCELLANEOUS JURASSIC PLANTS FROM OREGON.

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JURASSO-CRETACEOUS FLORAS.

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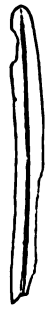
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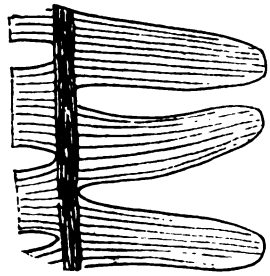
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JURASSO-CRETACEOUS PLANTS FROM OREGON AND ALASKA.

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PLATE XXXIX.

JURASSO-CRETACEOUS FLORA OF CAPE LISBURNE, ALASKA.

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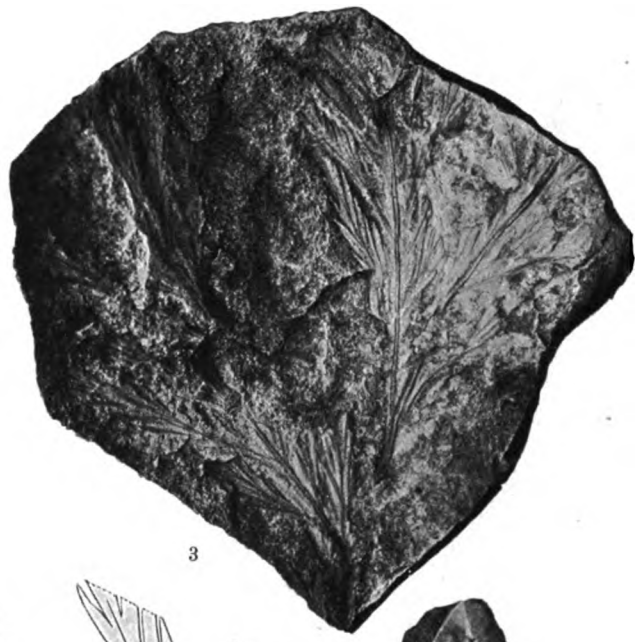
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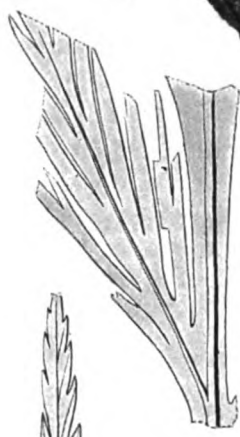
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JURASSO-CRETACEOUS FERNS FROM CAPE LISBURNE, ALASKA.

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PLATE XL.

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JURASSO-CRETACEOUS FLORA OF CAPE LISBURNE, ALASKA.

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FIGS. 1–9. CLADOPHLEBIS ALATA Font 158

Fig. 2. Enlarged portion of Fig. 1, × 2.

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Fig. 6. Enlarged portion of Fig. 5, × 3.

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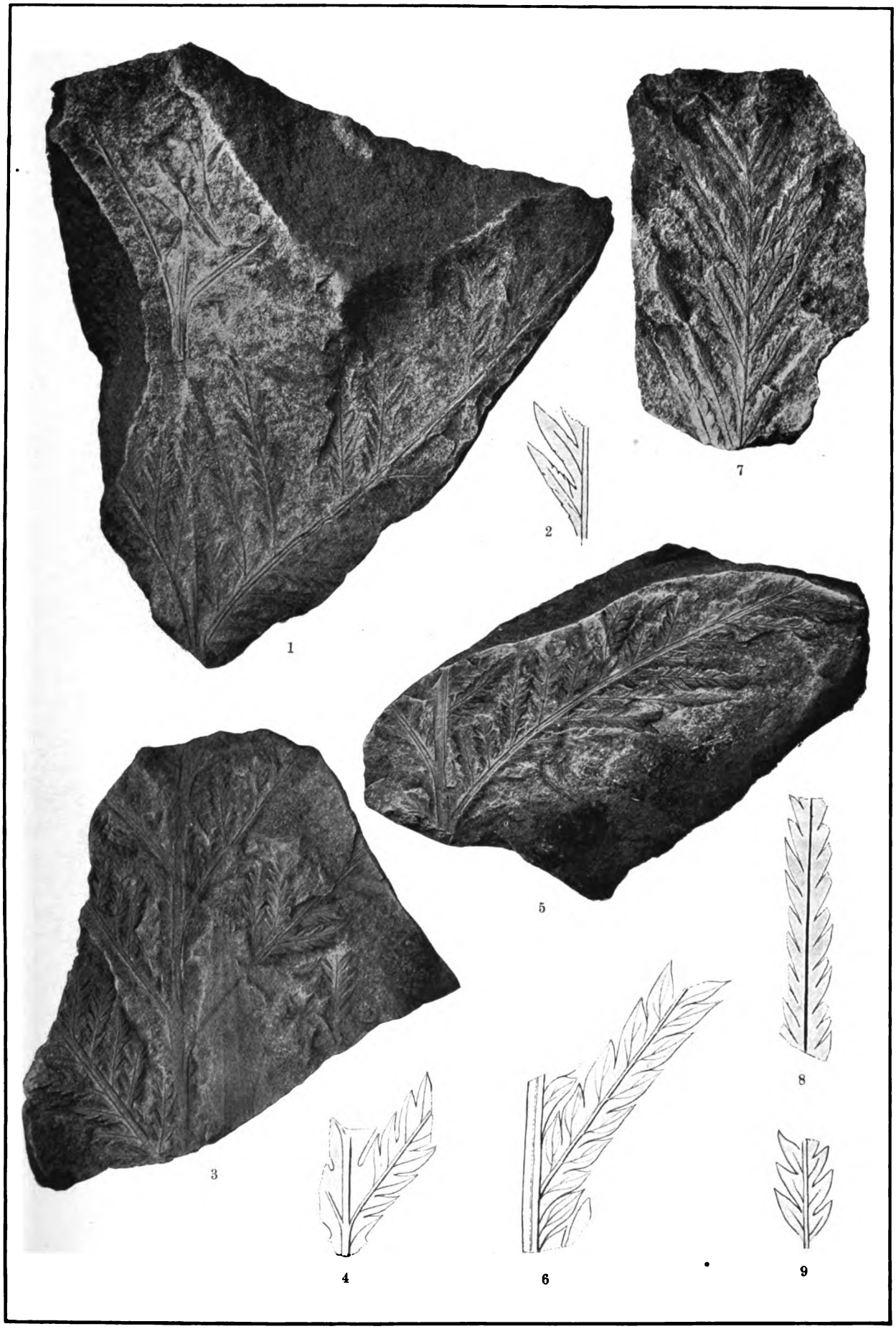

JURASSO-CRETACEOUS FERNS FROM CAPE LISBURNE, ALASKA.

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JURASSO-CRETACEOUS FLORA OF CAPE LISBURNE, ALASKA.

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FIGS. 1-5. CLADOPHLEBIS HUTTONI (Dunk.) Font. n. comb 161

Fig. 2. Portion of Fig. 1 enlarged, × ¾.

Fig. 3. Pinnule of Fig. 1 enlarged, × 2.

Fig. 4. Pinnule of Fig. 1 enlarged and restored × ¾.

Fig. 5. Portion of Fig. 1 enlarged and restored × ¾.

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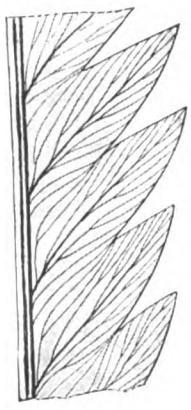

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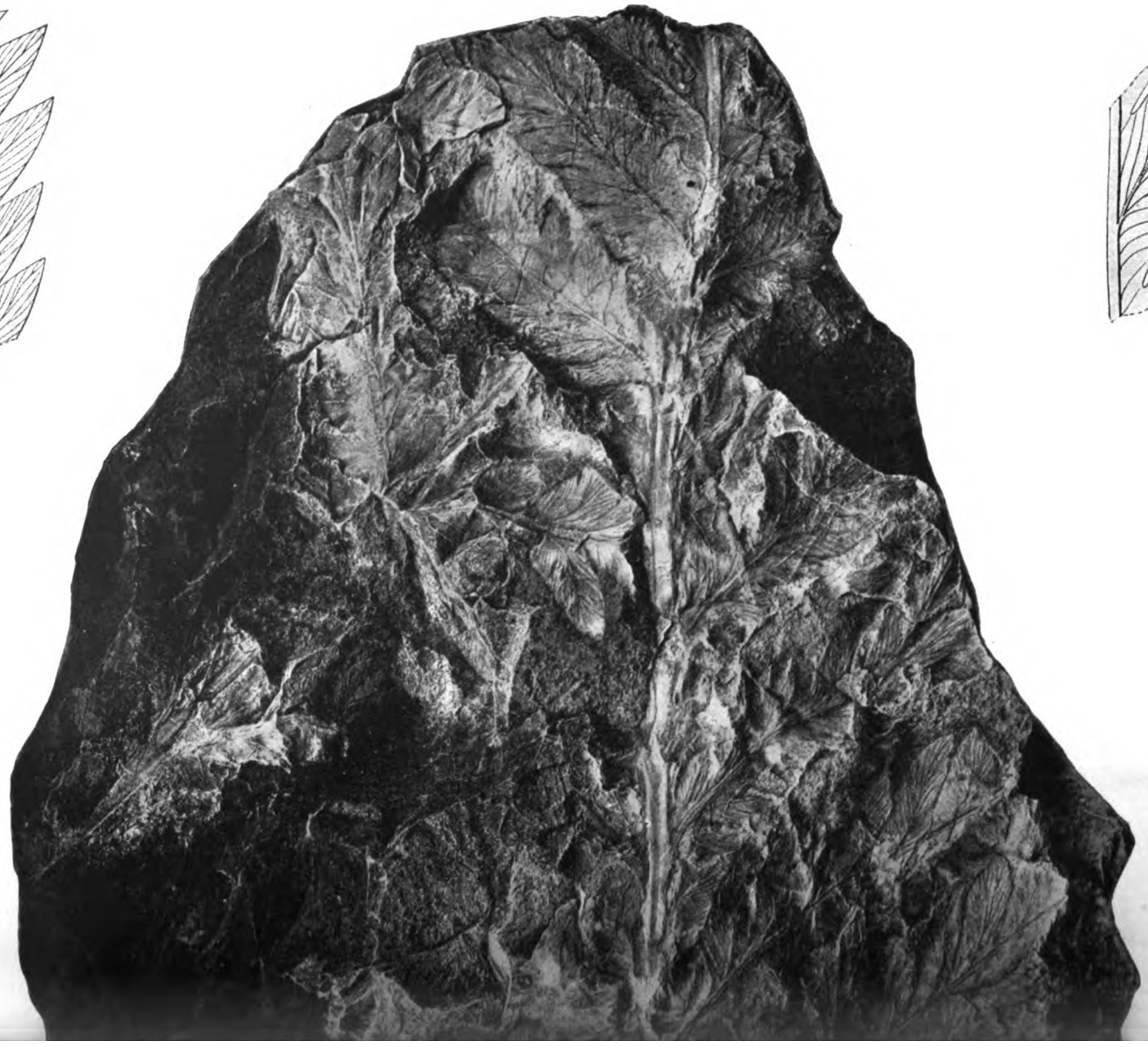

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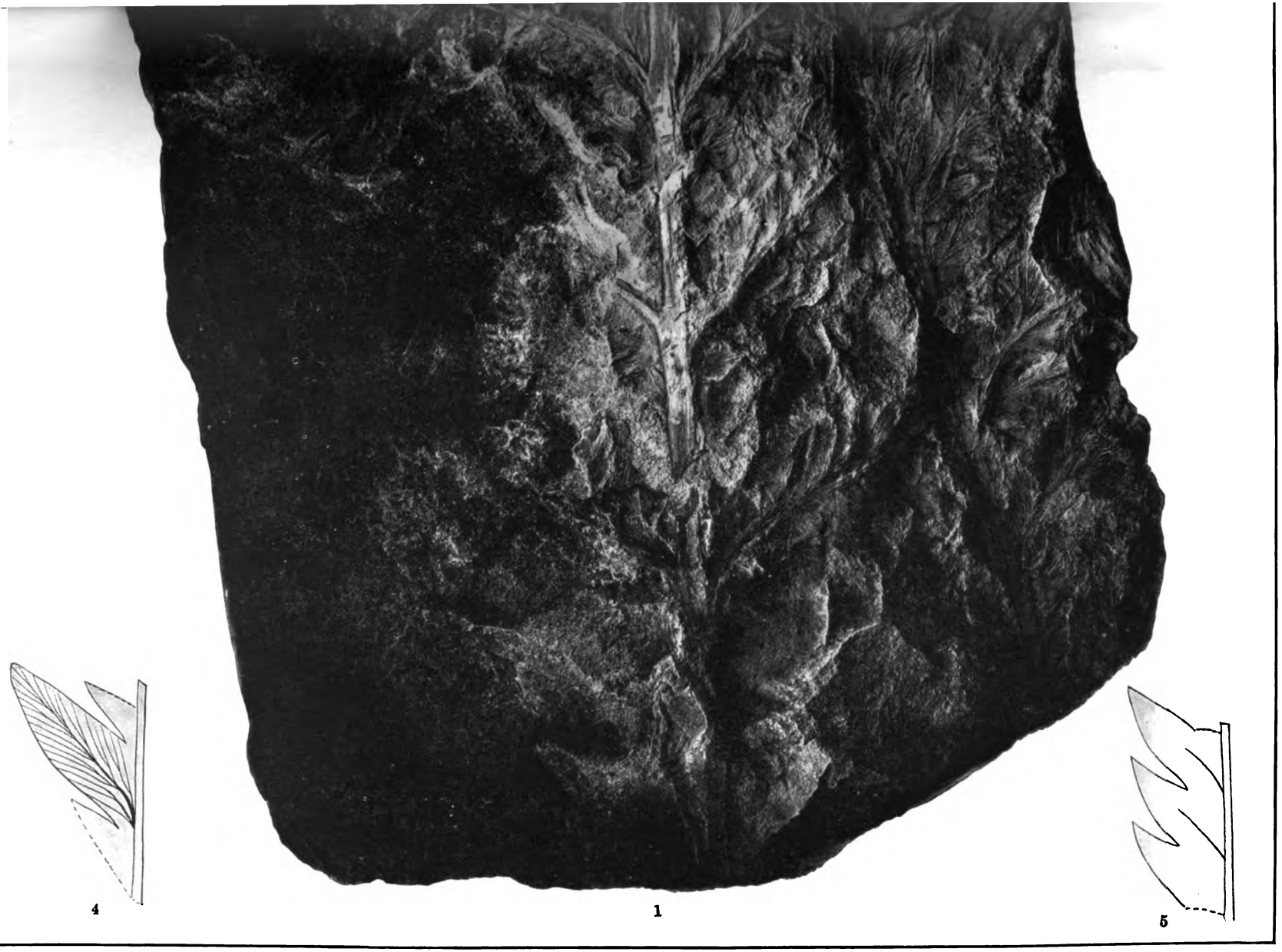

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JURASSO-CRETACEOUS FERNS FROM CAPE LISBURNE, ALASKA.

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PLATE XLII.

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PLATE XLII.

Jurasso-Cretaceous Flora of Cape Lisburne, Alaska.

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Figs. 1–3 Cladophlebis Huttoni (Dunk.) Font. n. comb 161

Fig. 2. Enlarged pinnule of Fig. 1, × 2.

Fig. 3. Portion of Fig. 1 enlarged and restored, × ¾.

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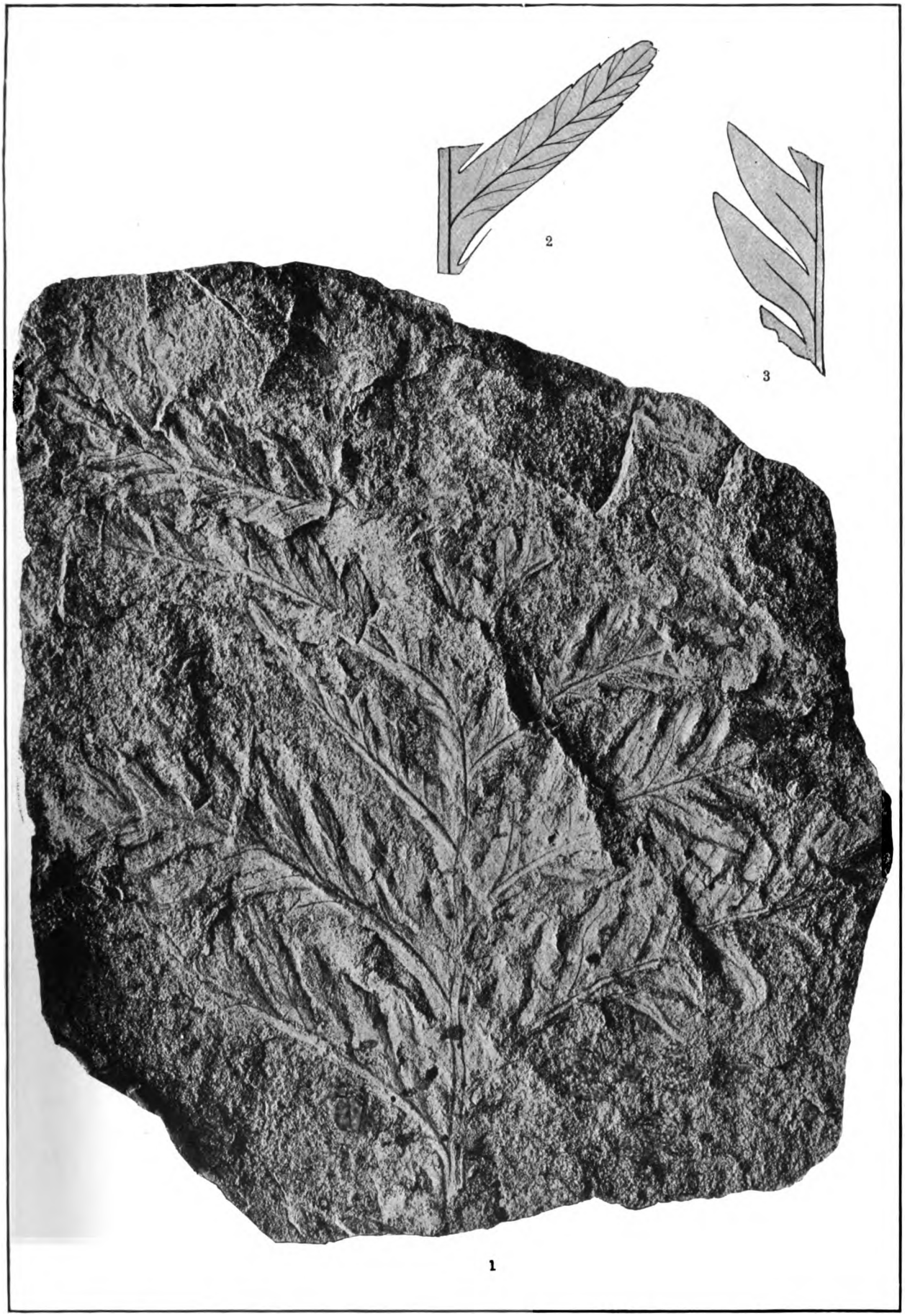

JURASSO-CRETACEOUS FERNS FROM CAPE LISBURNE, ALASKA.

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PLATE XLIII.

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JURASSO-CRETACEOUS FLORA OF CAPE LISBURNE, ALASKA.

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FIGS. 1–7. CLADOPHLEBIS HUTTONI (Dunk.) Font. n. comb 161

Fig. 2. Portion of Fig. 1 enlarged, × 2.

Fig. 3. Pinnule of Fig. 1 restored and slightly enlarged.

Fig. 5. Enlarged pinnule of Fig. 4, × 2.

Fig. 6. Pinnule of Fig. 4 restored and slightly enlarged.

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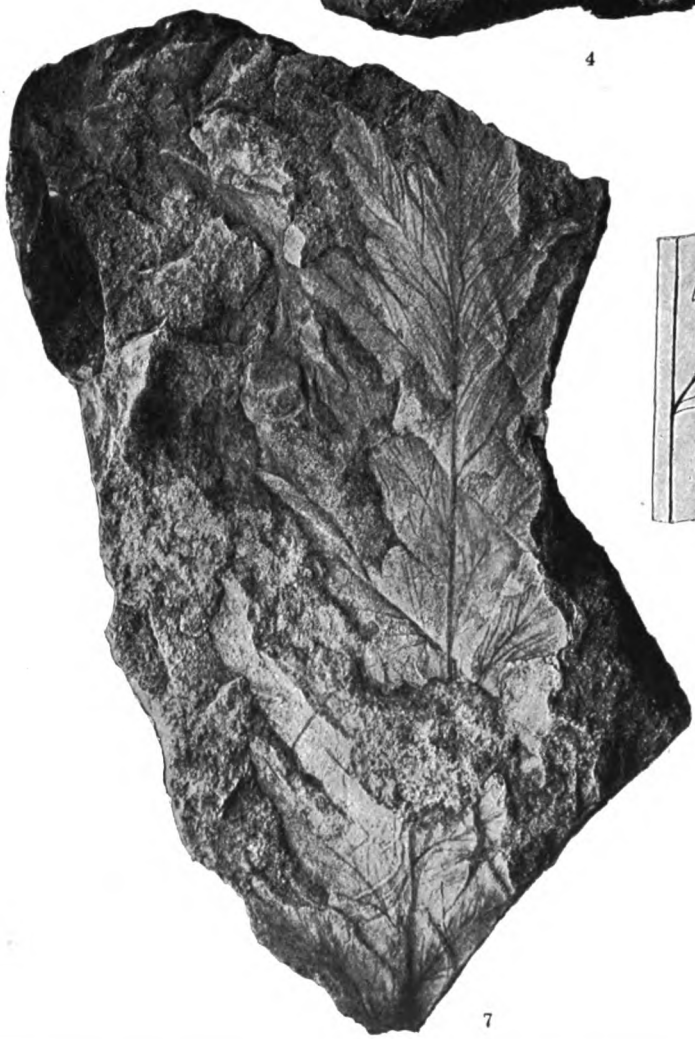

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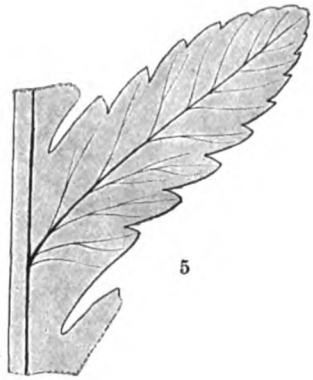

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JURASSO-CRETACEOUS FERNS FROM CAPE LISBURNE, ALASKA.

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JURASSO-CRETACEOUS CYCADS AND GINGKOACEÆ FROM CAPE LISBURNE, ALASKA.

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JURASSO-CRETACEOUS FLORA OF ALASKA, MONTANA, AND CALIFORNIA.

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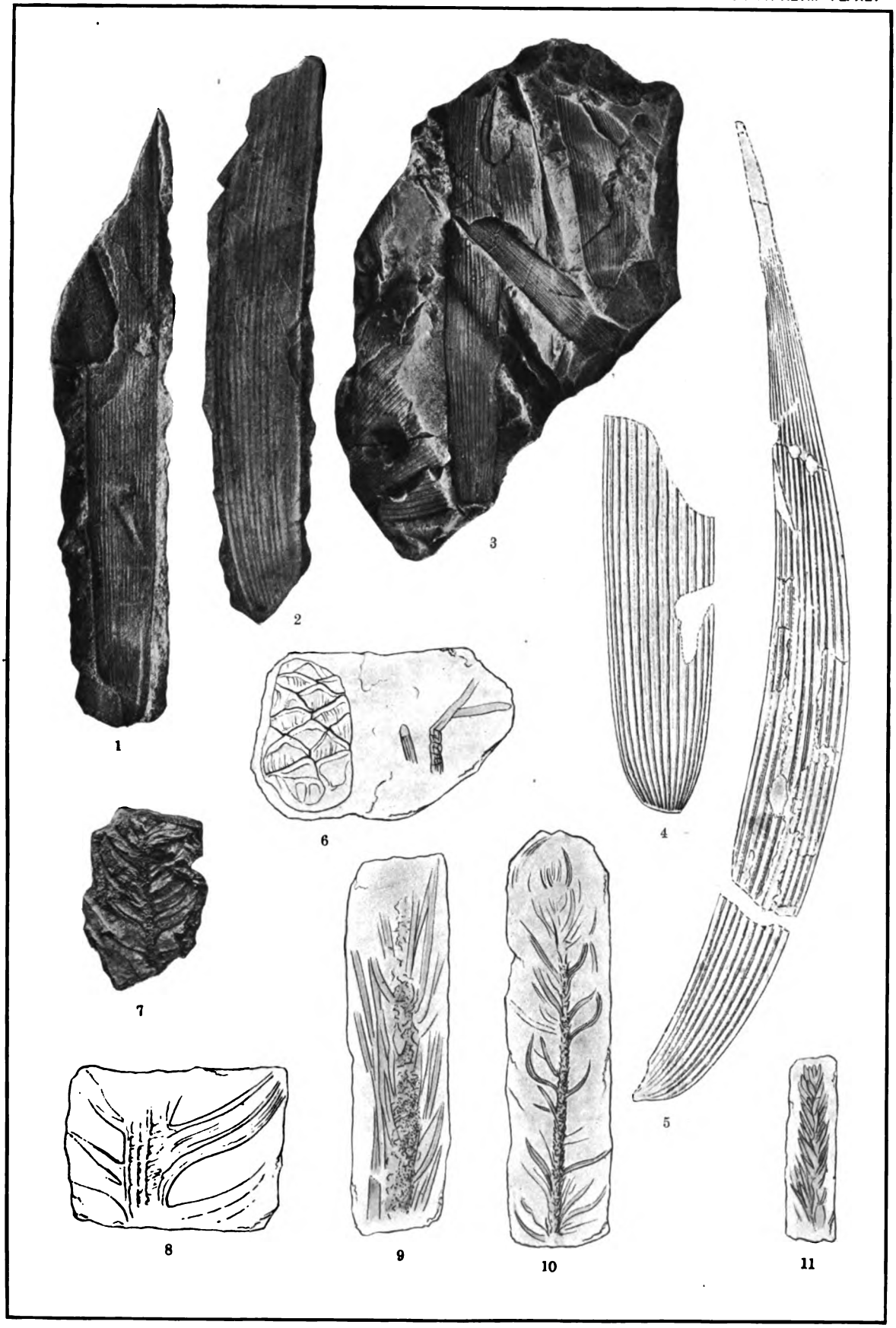

JURASSO-CRETACEOUS CONIFERS FROM ALASKA, MONTANA, AND CALIFORNIA.

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JURASSIC CYCADS FROM THE FREEZEOUT HILLS, WYOMING.

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View of one side and part of the base of the trunk consisting of Nos. 500.88, 500.513, and 500.525 of the museum of the University of Wyoming.

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JURASSIC CYCADS FROM WYOMING.

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JURASSIC CYCADS FROM THE FREEZEOUT HILLS, WYOMING.

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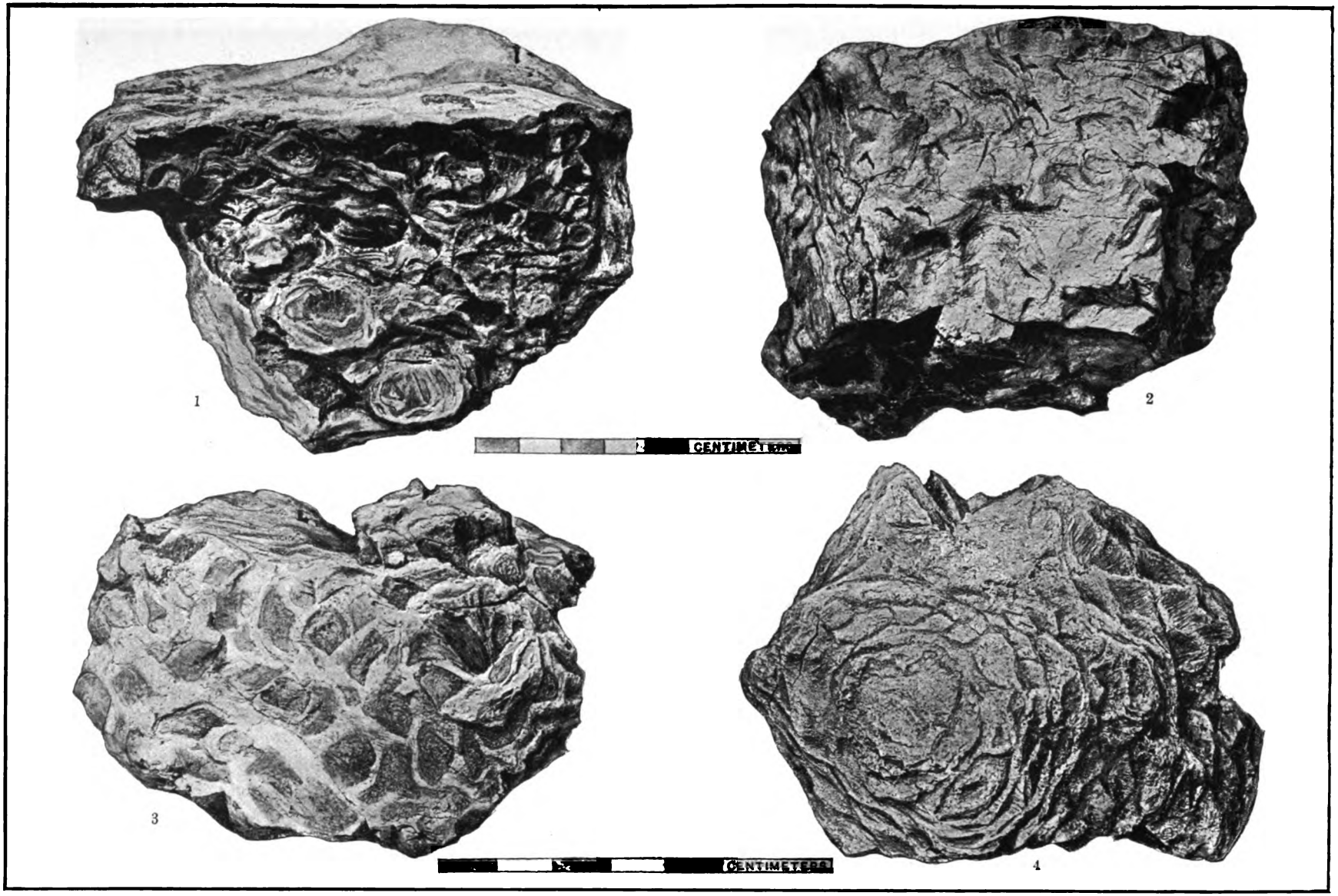

JURASSIC CYCADS FROM WYOMING.

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JURASSIC CYCADS FROM THE FREEZEOUT HILLS, WYOMING.

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CYCADELLA COMPRESSA Ward..... 186

FIG. 1. Side and top view of the small trunk No. 500.503 of the museum of the University of Wyoming.

FIG. 2. Side view of the small trunk No. 100.228 of the museum of the University of Wyoming.

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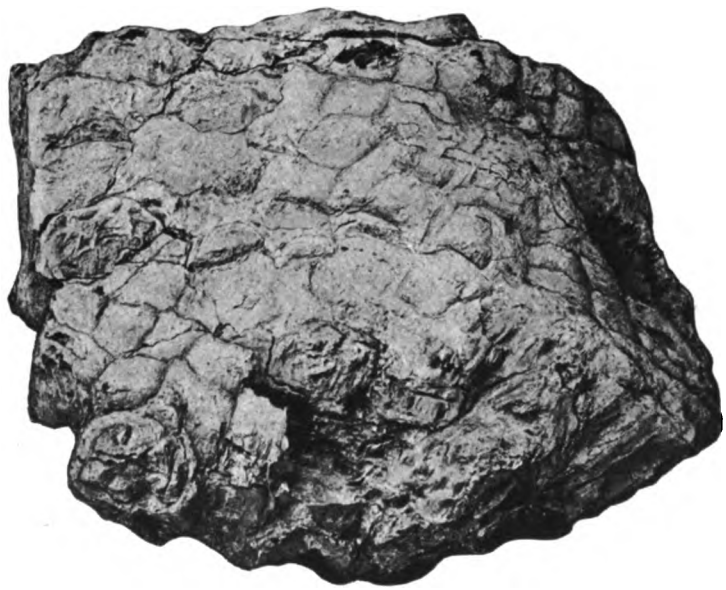

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CENTIMETERS

JURASSIC CYCADS FROM WYOMING.

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JURASSIC CYCADS FROM THE FREEZEOUT HILLS, WYOMING.

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CYCADELLA JURASSICA Ward..... 186

View of the surface of the segment resulting from the union of the fragments Nos. 100.204 and 500.507 of the museum of the University of Wyoming.

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Side view of the trunk No. 500.509 of the museum of the University of Wyoming.

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JURASSIC CYCADS FROM THE FREEZEOUT HILLS, WYOMING.

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CYCADELLA NODOSA Ward..... 187

Side view showing also part of the base of the trunk No. 100:206 of the museum of the University of Wyoming.

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JURASSIC CYCADS FROM WYOMING.

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JURASSIC CYCADS FROM THE FREEZEOUT HILLS, WYOMING.

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Side view of the small trunk No. 100.229 of the museum of the University of Wyoming.

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Figs. 3, 4. Views of the internal structure shown in the fractures of Nos. 500.422 and 500.136, respectively, of the museum of the University of Wyoming.

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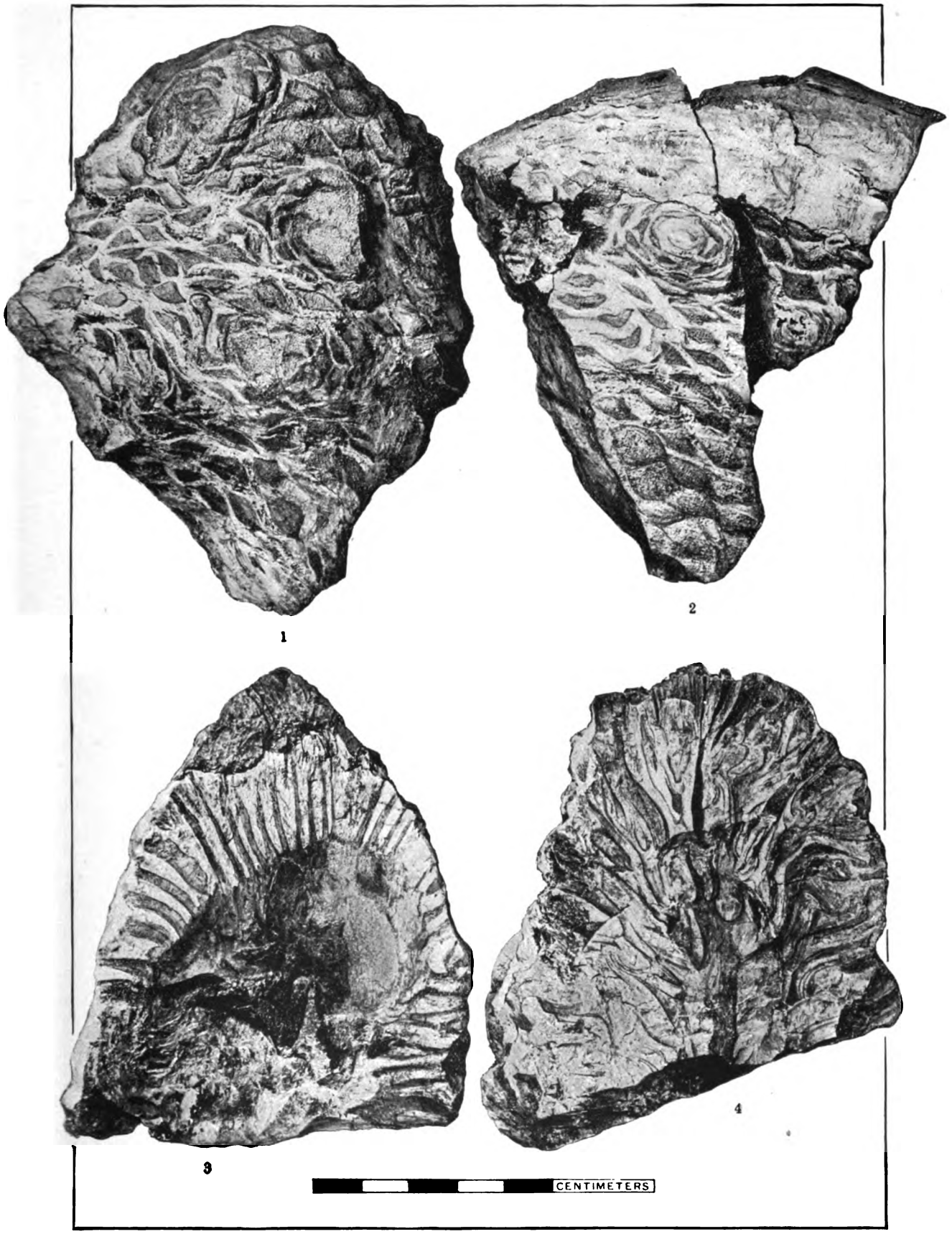

JURASSIC CYCADS FROM WYOMING.

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JURASSIC CYCADS FROM THE FREEZEOUT HILLS, WYOMING.

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CYCADELLA CIRRATA Ward..... 188

View of the internal structure shown in the tangential fracture of the fragment No. 100.245 of the museum of the University of Wyoming.

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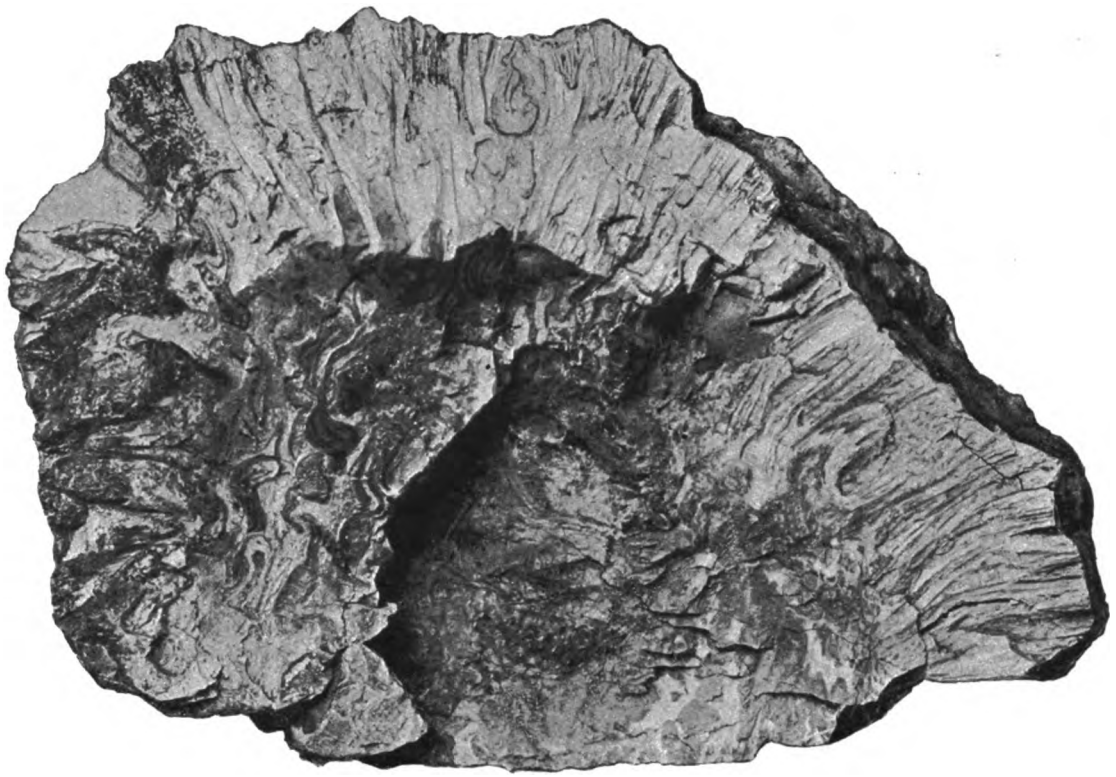

JURASSIC CYCADS FROM WYOMING.

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JURASSIC CYCADS FROM THE FREEZEOUT HILLS, WYOMING.

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CYCADELLA EXOGENA Ward..... 189

FIG. 1. View of the tangential fracture of the trunk No. 500.514 of the museum of the University of Wyoming.

FIGS. 2, 3. Views of the radial fractures of the two fragments Nos. 500.416 and 500.174, respectively, of the museum of the University of Wyoming, showing the exogenous structure and woody wedges.

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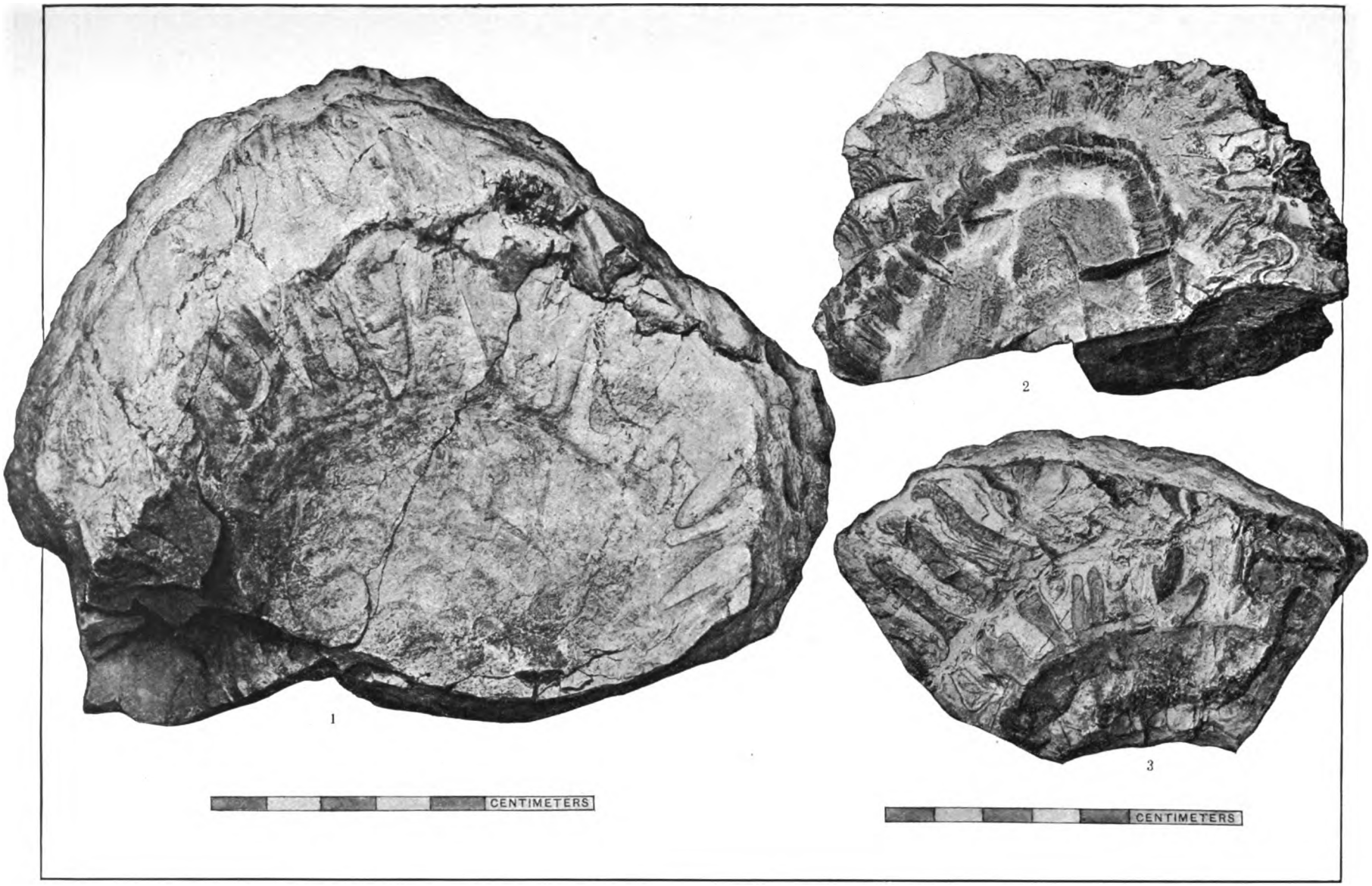

JURASSIC CYCADS FROM WYOMING.

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PLATE LV.

JURASSIC CYCADS FROM THE FREEZEOUT HILLS, WYOMING.

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FIG. 1. Side view of the trunk No. 100.214 of the museum of the University of Wyoming.

FIG. 2. View of the rough radial fracture of the fragment No. 100.201 of the museum of the University of Wyoming.

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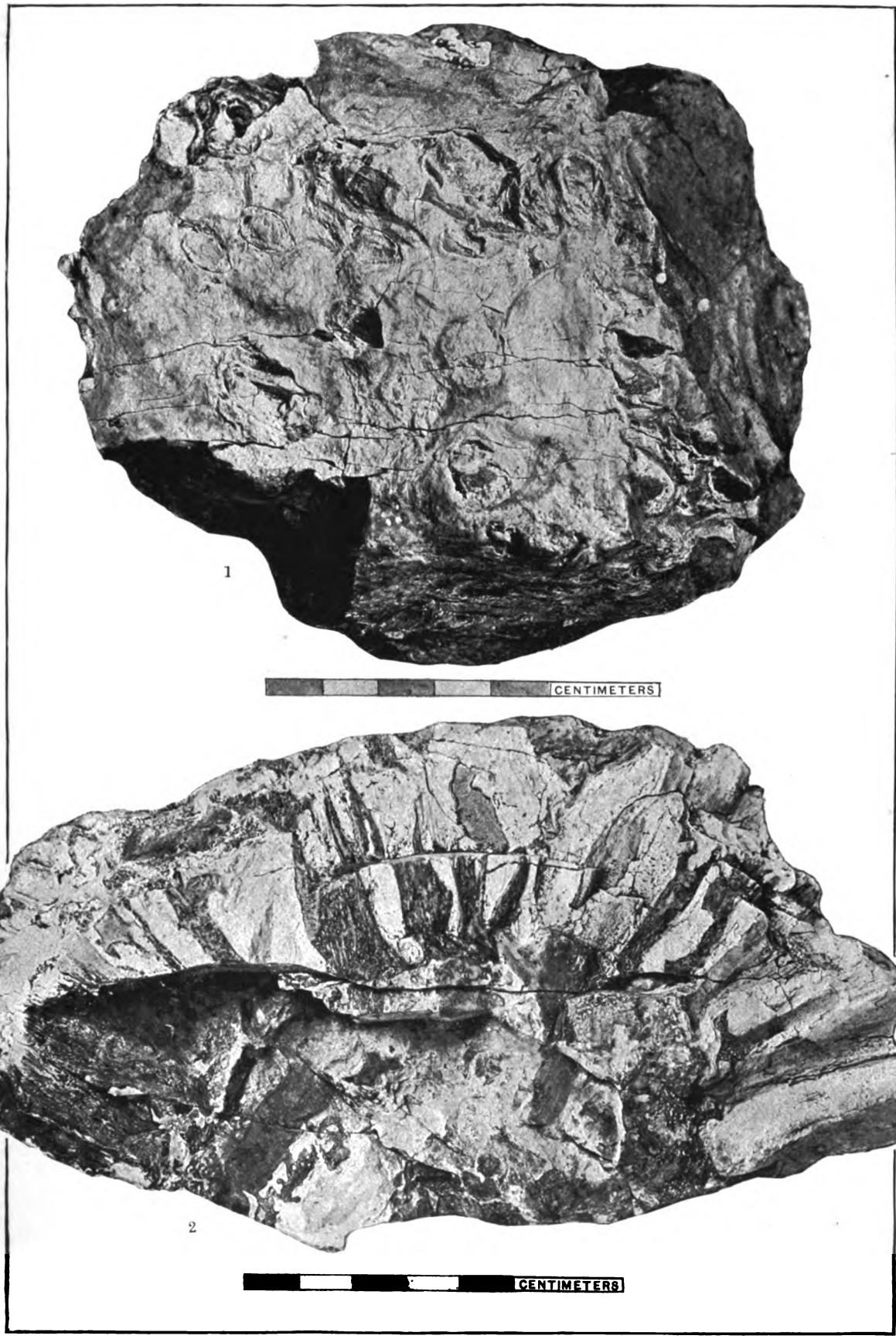

JURASSIC CYCADS FROM WYOMING.

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JURASSIC CYCADS FROM THE FREEZEOUT HILLS, WYOMING.

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CYCADELLA CONTRACTA Ward..... 192

FIG. 1. Side view of the imperfect trunk No. 100.218 of the museum of the University of Wyoming.

FIGS. 2, 3. Views of the outer and inner surfaces, respectively, of the small trunk No. 100.241 of the museum of the University of Wyoming.

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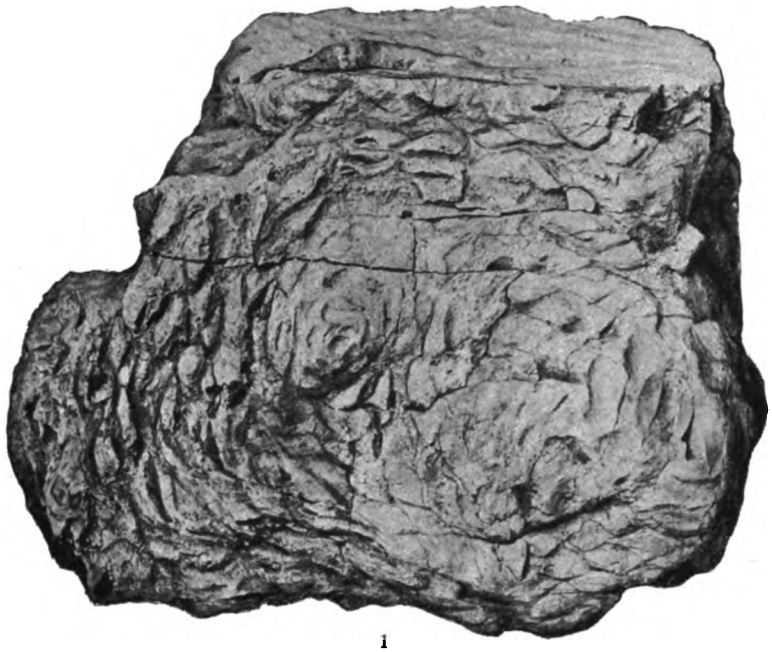

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CENTIMETERS

JURASSIC CYCADS FROM WYOMING.

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JURASSIC CYCADS FROM THE FREEZEOUT HILLS, WYOMING.

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Side view of the trunk consisting of Nos. 500.515 and 500.491 of the museum of the University of Wyoming.

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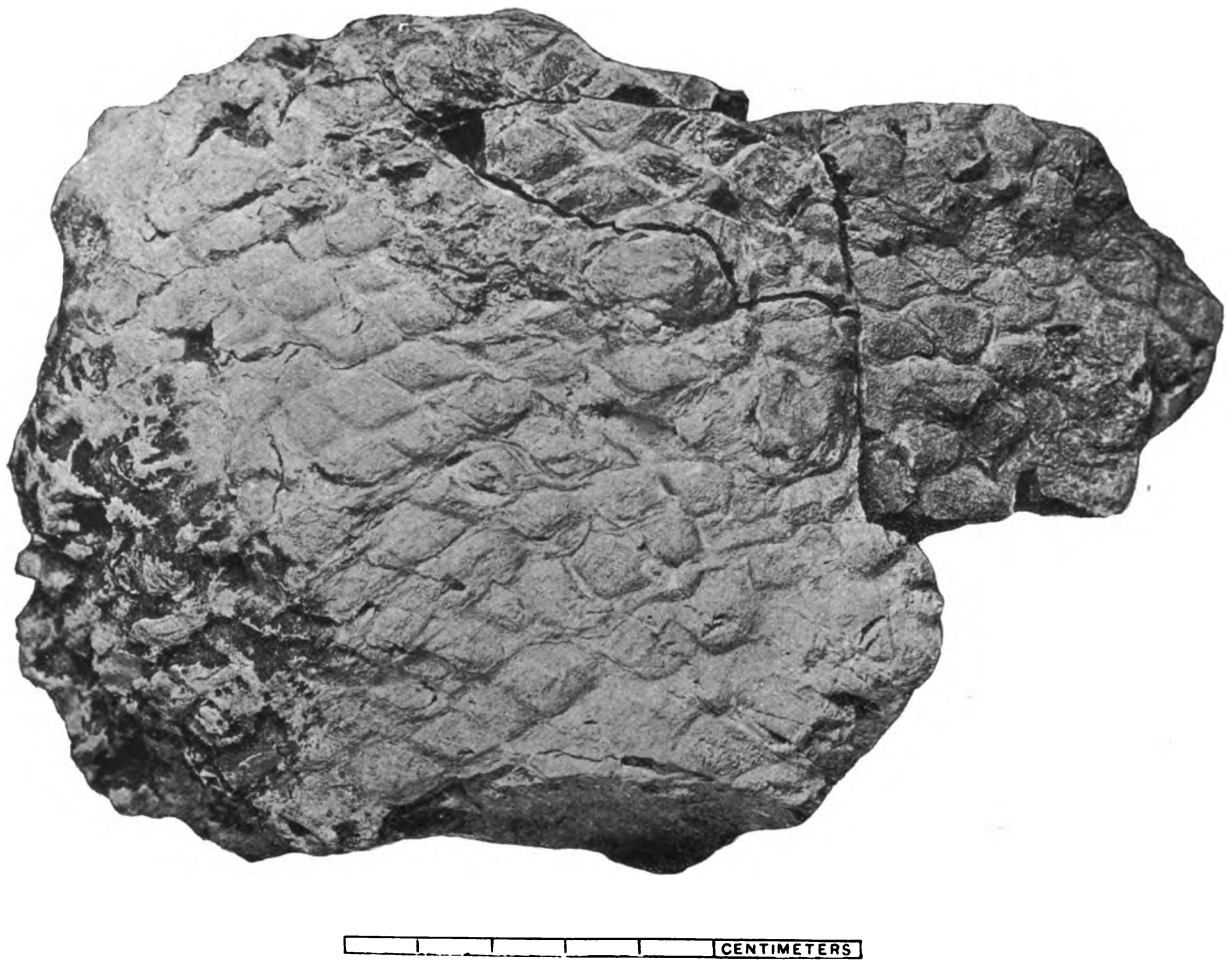

JURASSIC CYCADS FROM WYOMING.

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JURASSIC CYCADS FROM THE FREEZEOUT HILLS, WYOMING.

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CYCADELLA CREPIDARIA Ward..... 195

View of the best preserved side of the trunk, consisting of Nos. 100.202, 100.215 and 100.230 of the museum of the University of Wyoming.

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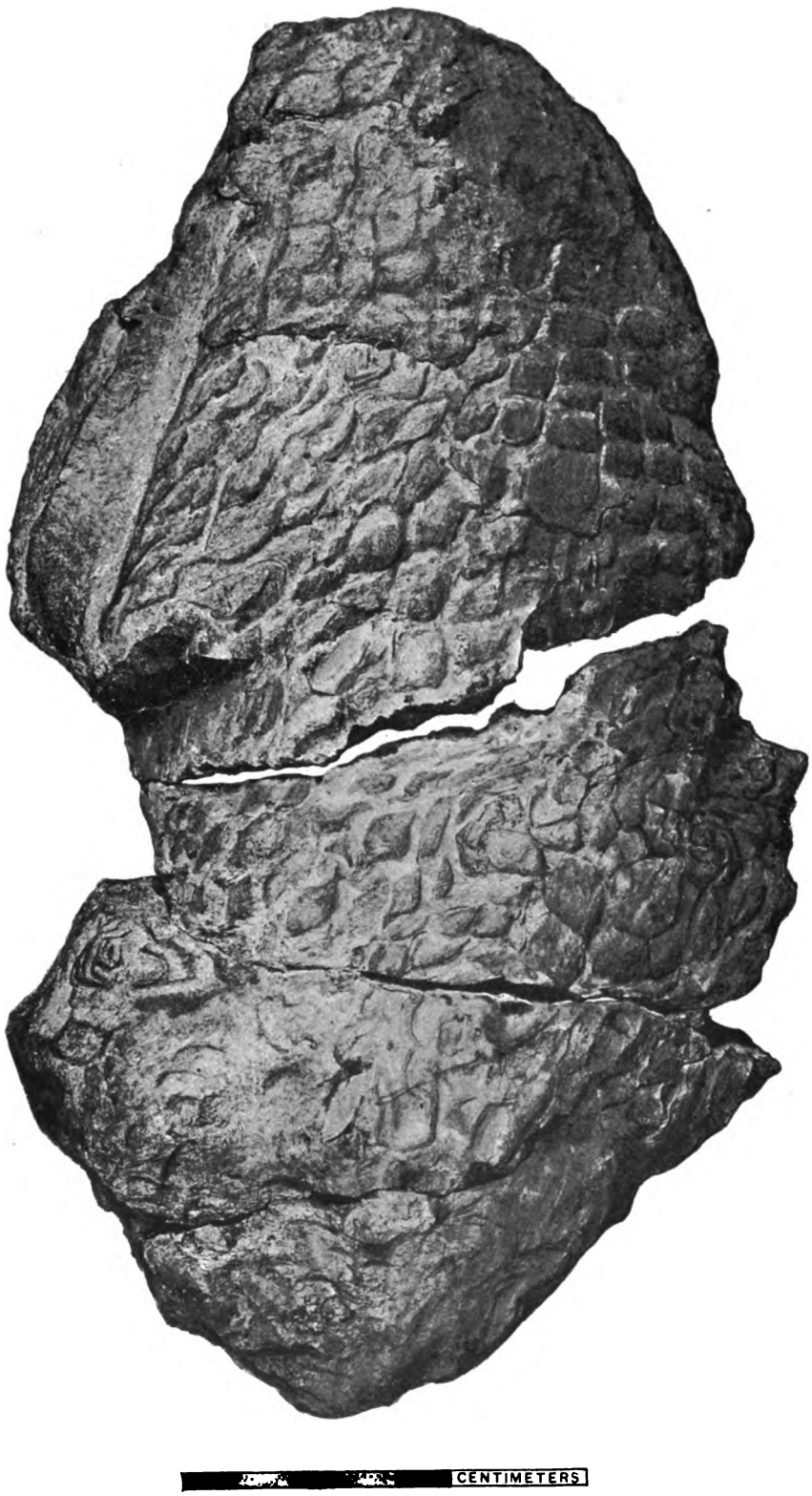

JURASSIC CYCADS FROM WYOMING.

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JURASSIC CYCADS FROM THE FREEZEOUT HILLS, WYOMING.

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CYCADELLA CREPIDARIA Ward..... 195

View of one side of the trunk No. 100.203 of the museum of the University of Wyoming.

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CENTIMETERS

JURASSIC CYCADS FROM WYOMING.

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PLATE LXI.

JURASSIC CYCADS FROM THE FREEZEOUT HILLS, WYOMING.

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CYCADELLA KNIGHTII Ward..... 197

View of the convex side of the trunk No. 500.687 of the museum of the University of Wyoming.

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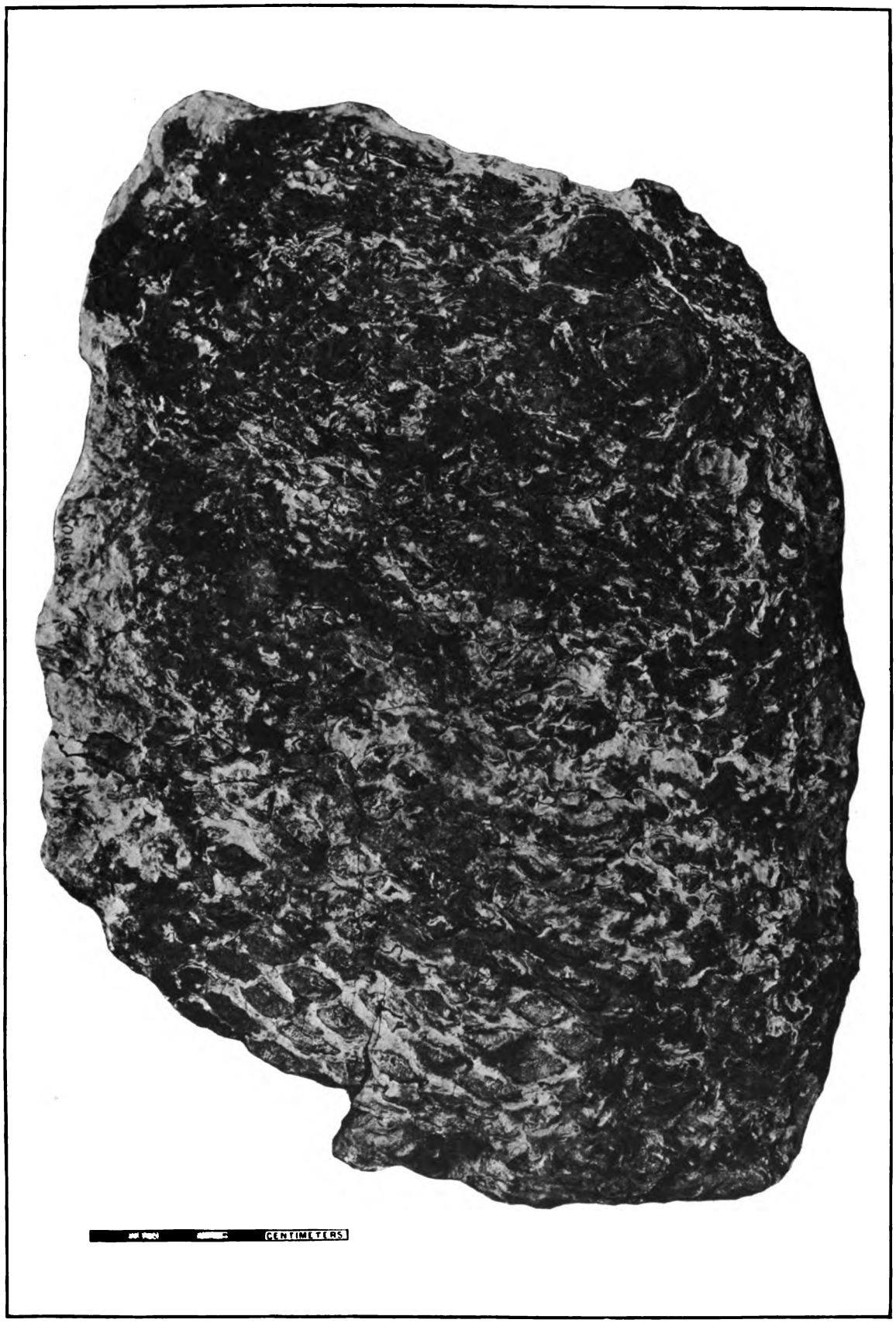

JURASSIC CYCADS FROM WYOMING.

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PLATE LXI.

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PLATE LXI.

JURASSIC CYCADS FROM THE FREEZEOUT HILLS, WYOMING.

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View of the convex side of the trunk No. 500.687 of the museum of the University of Wyoming.

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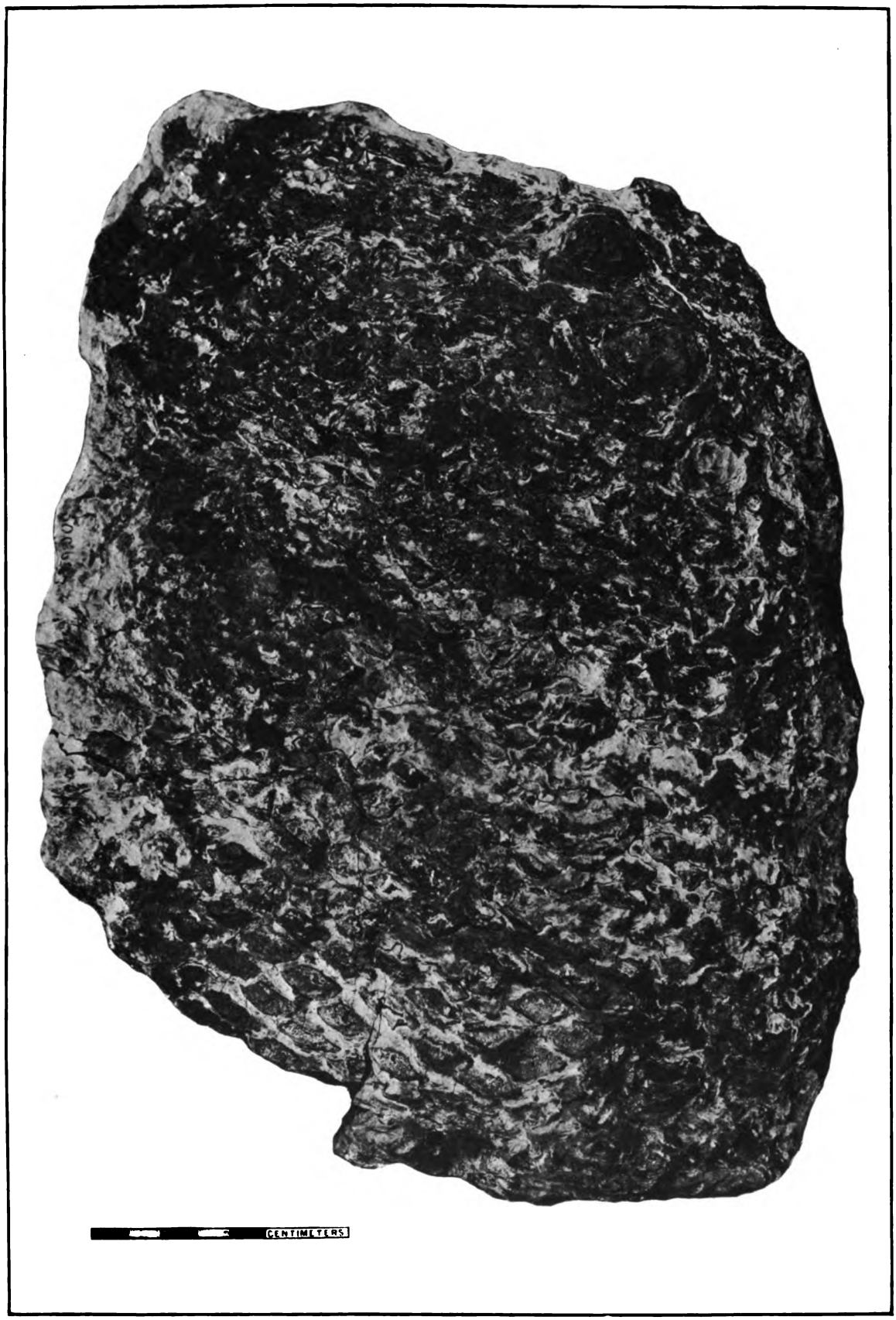

JURASSIC CYCADS FROM WYOMING.

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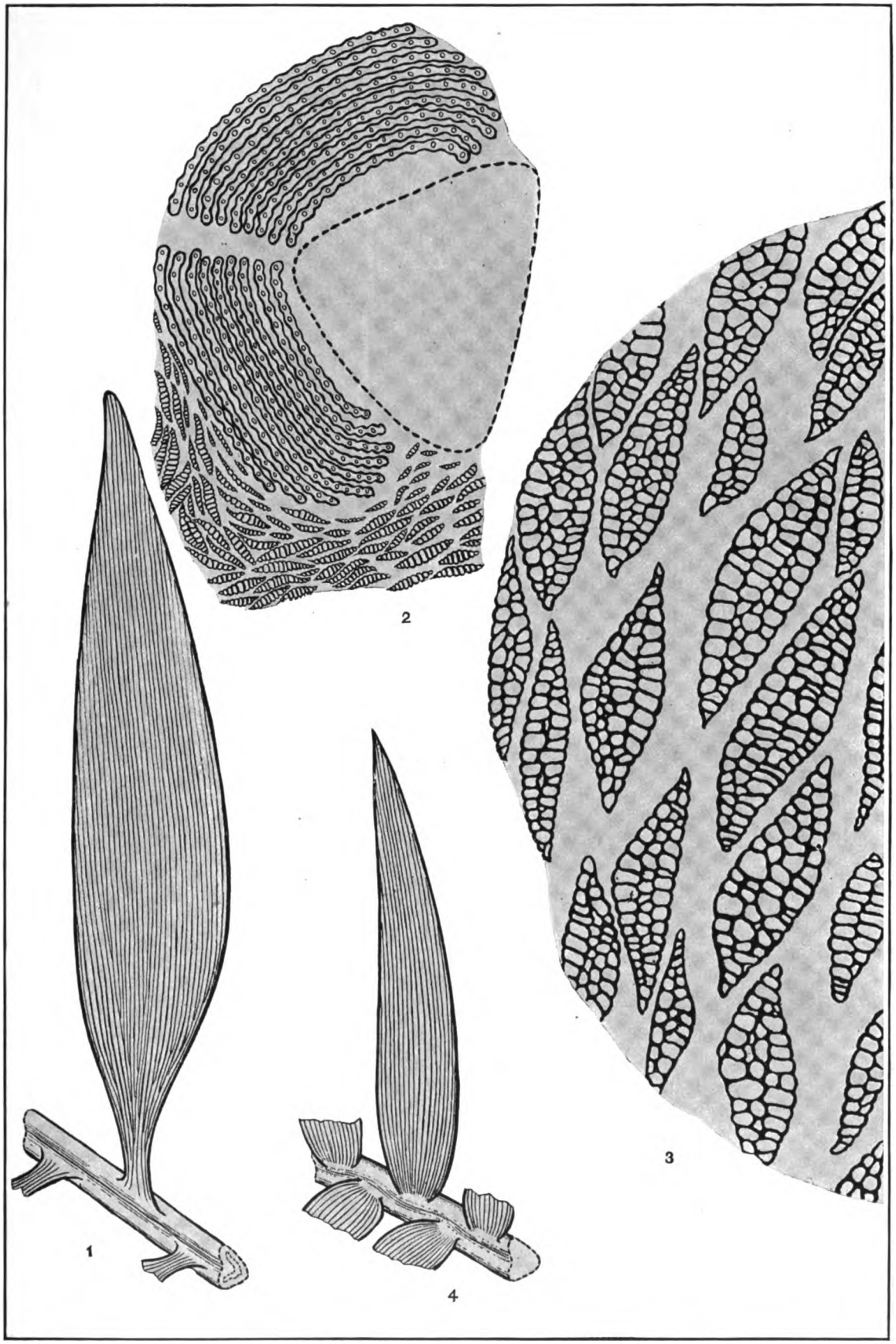

JURASSIC CYCADS FROM WYOMING.

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JURASSIC CYCADS FROM WYOMING.

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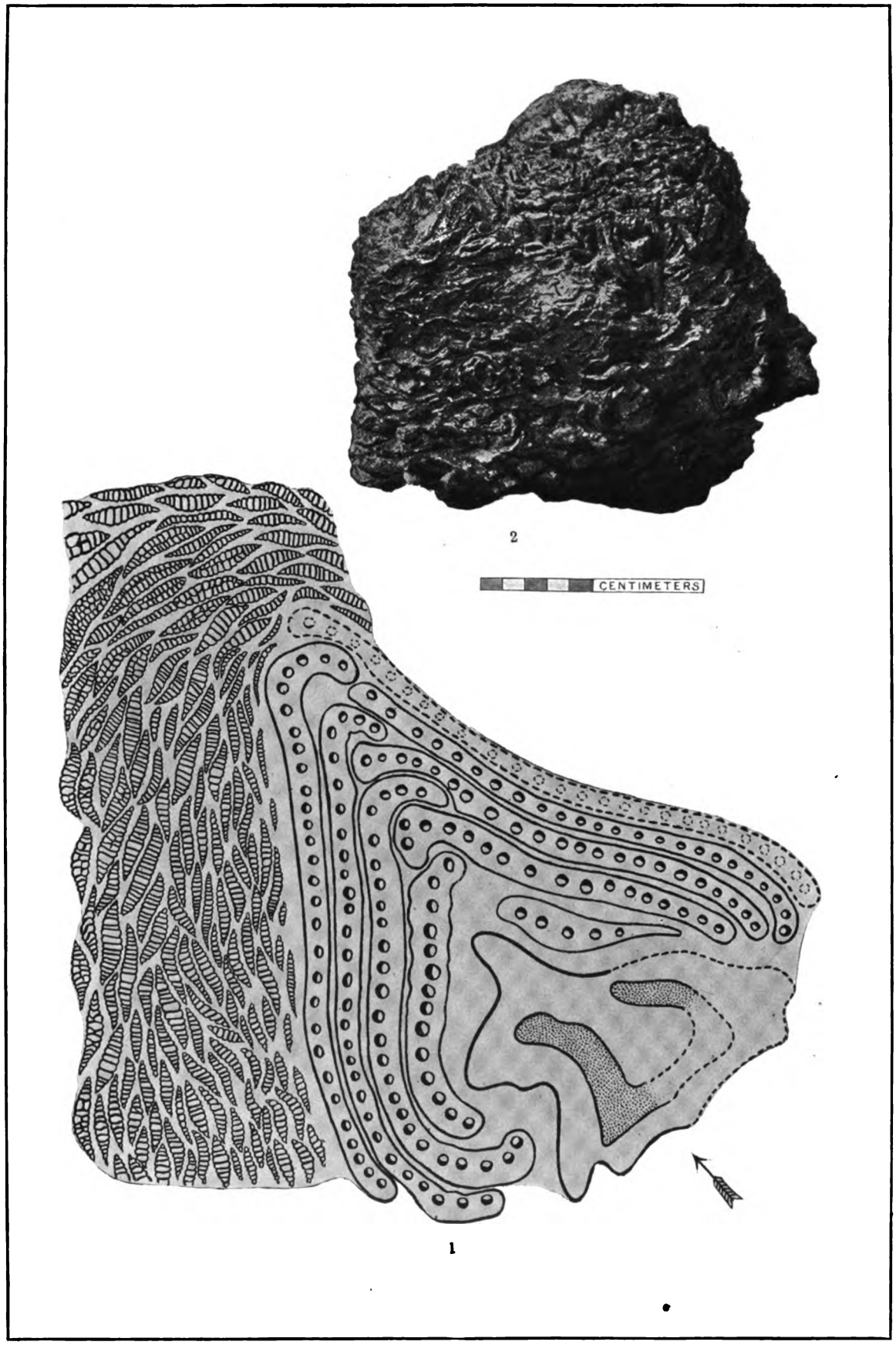

JURASSIC CYCADS FROM WYOMING.

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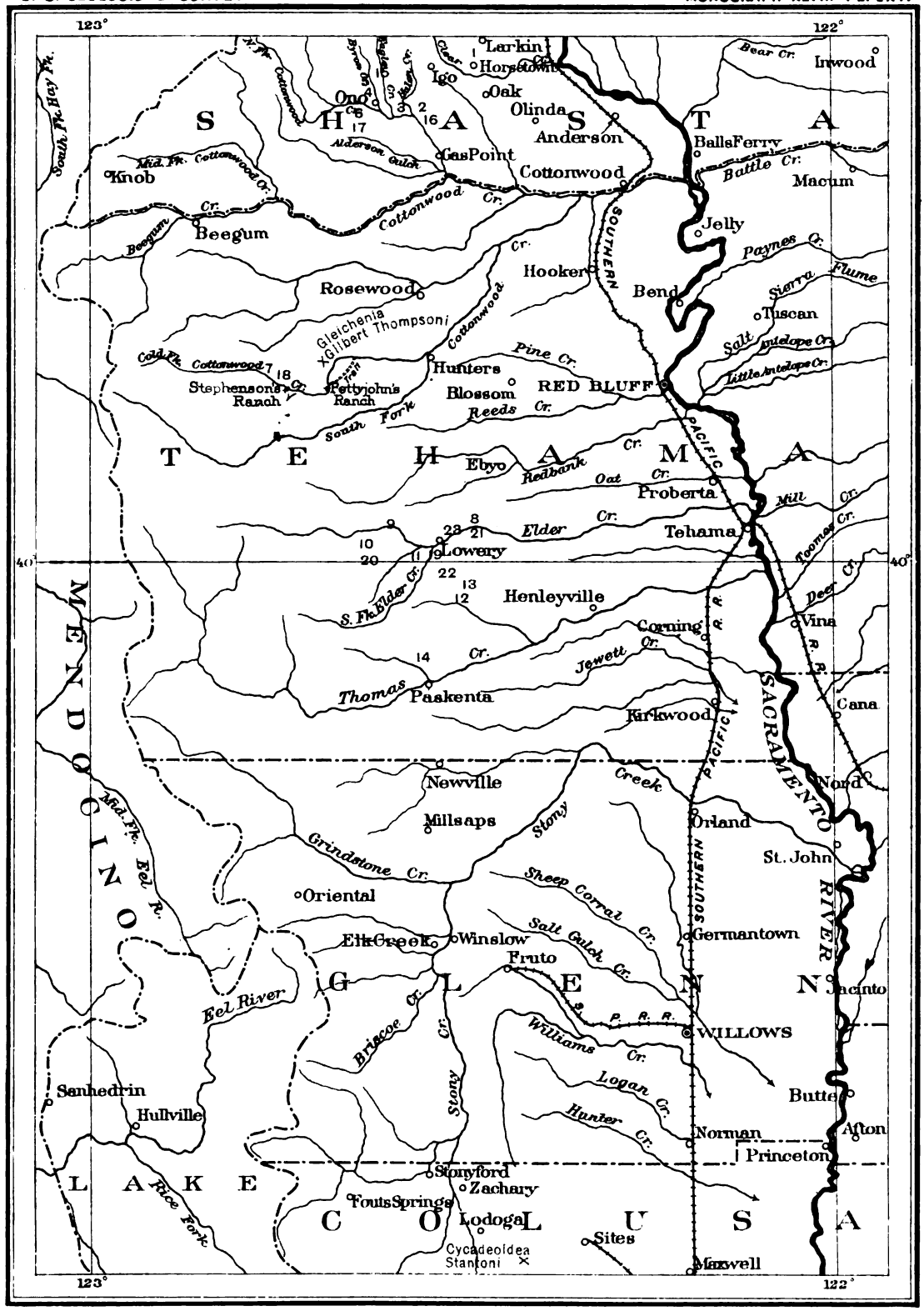

SKETCH MAP SHOWING FOSSIL LOCALITIES OF THE SHASTA FORMATION
NORTHERN CALIFORNIA

Scale
0 10 20 30 miles

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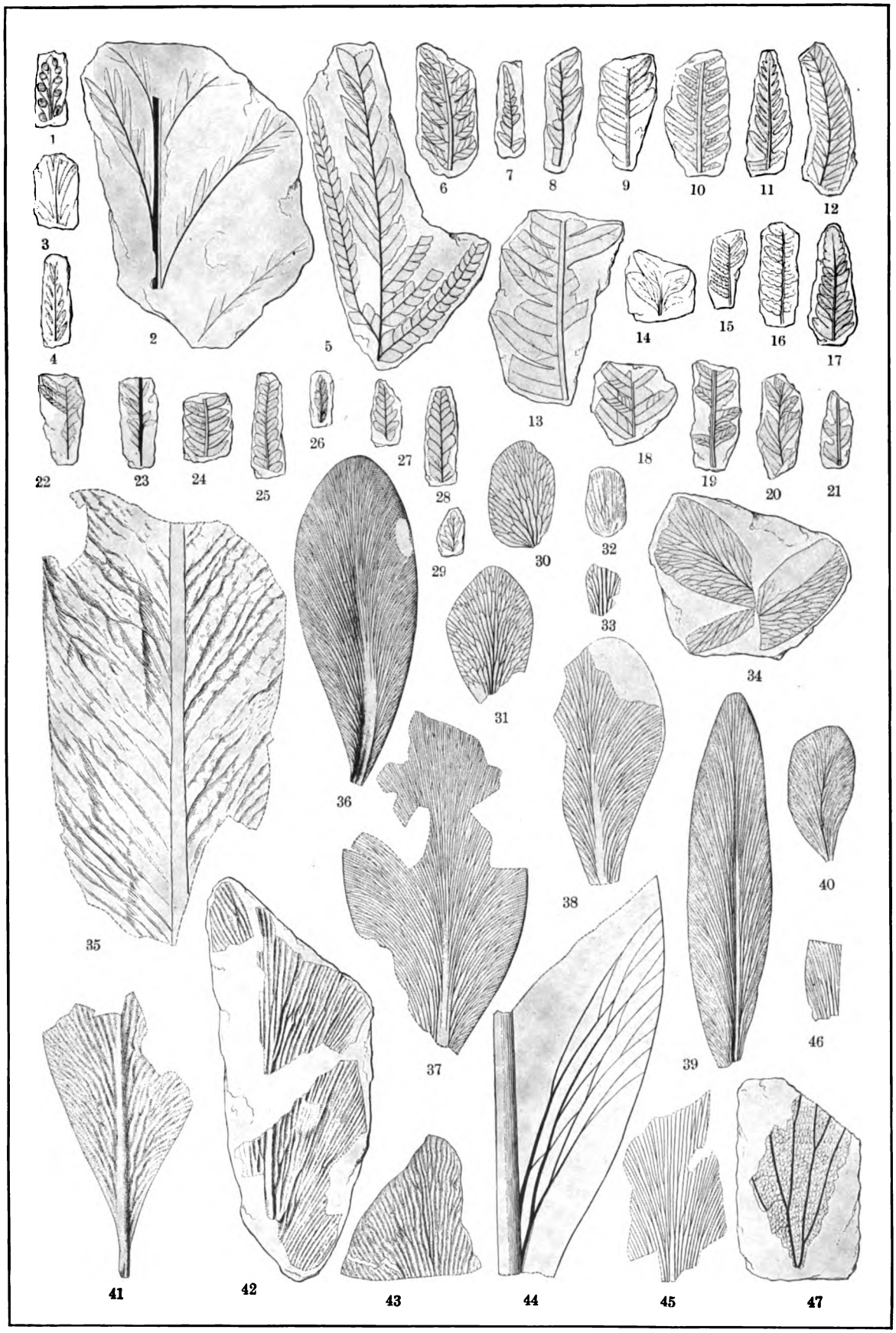

FERNS FROM THE SHASTA FORMATION OF CALIFORNIA AND OREGON.

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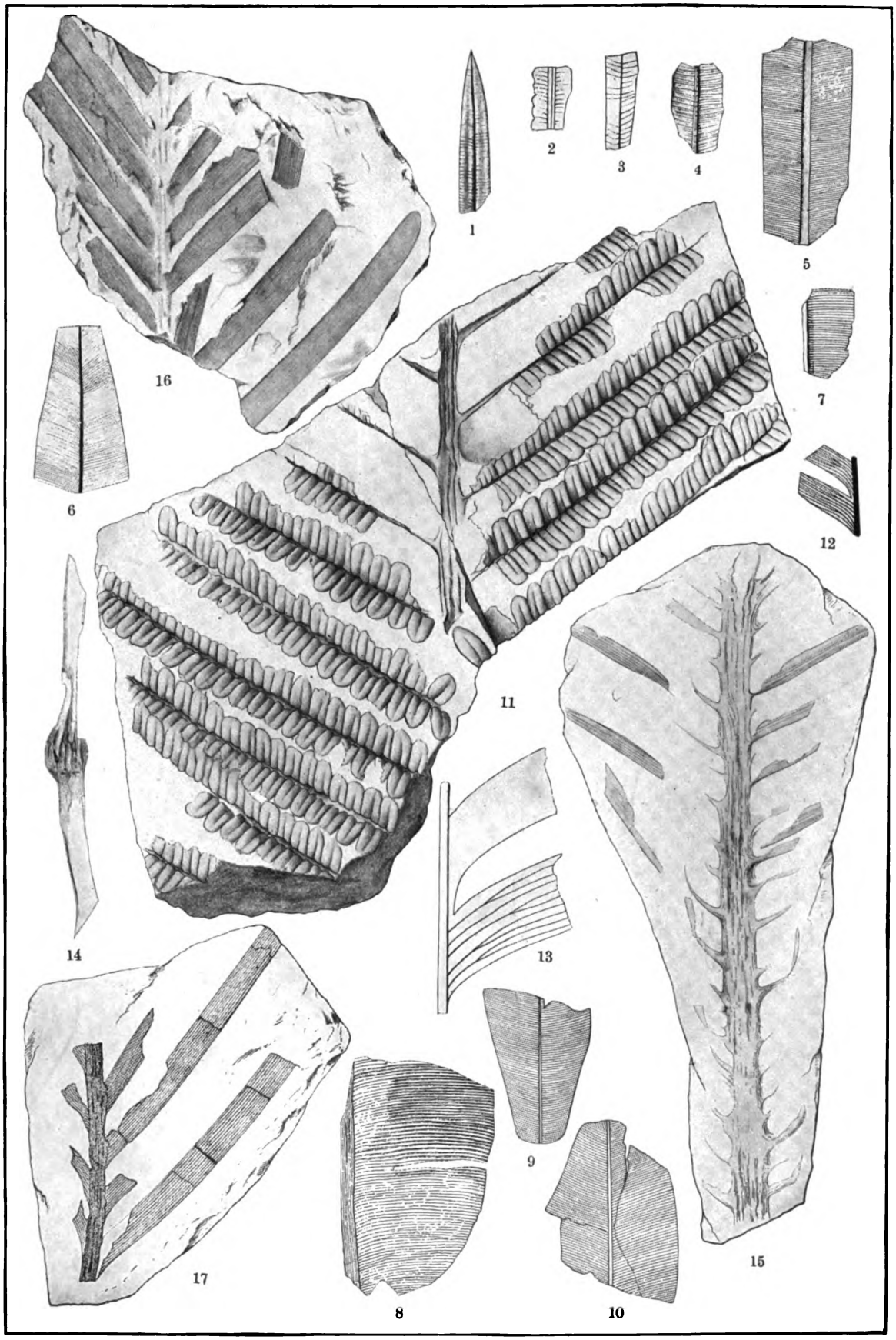

FERNS FROM THE SHASTA FORMATION OF CALIFORNIA AND OREGON.

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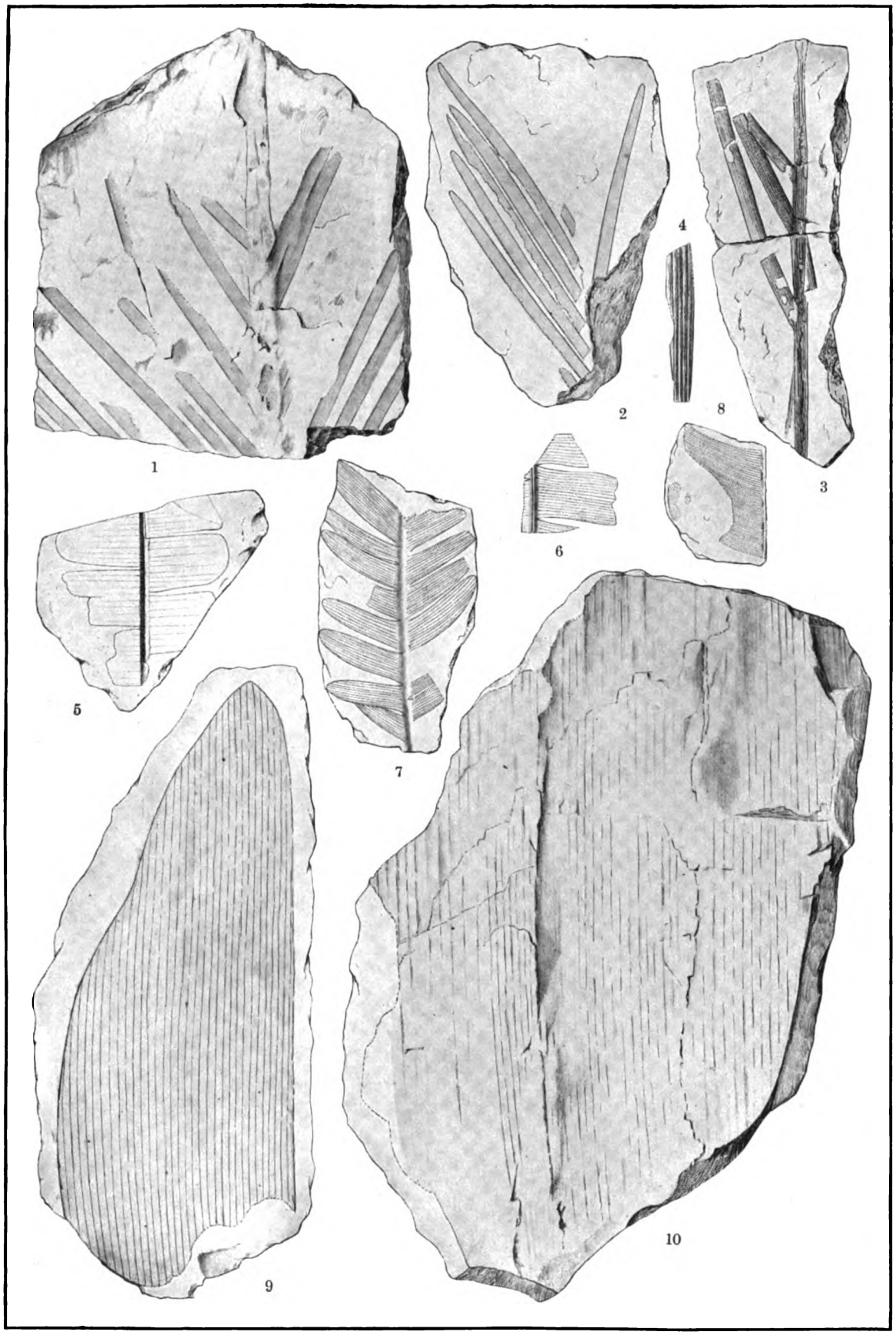

CYCADS FROM THE SHASTA FORMATION OF CALIFORNIA AND OREGON.

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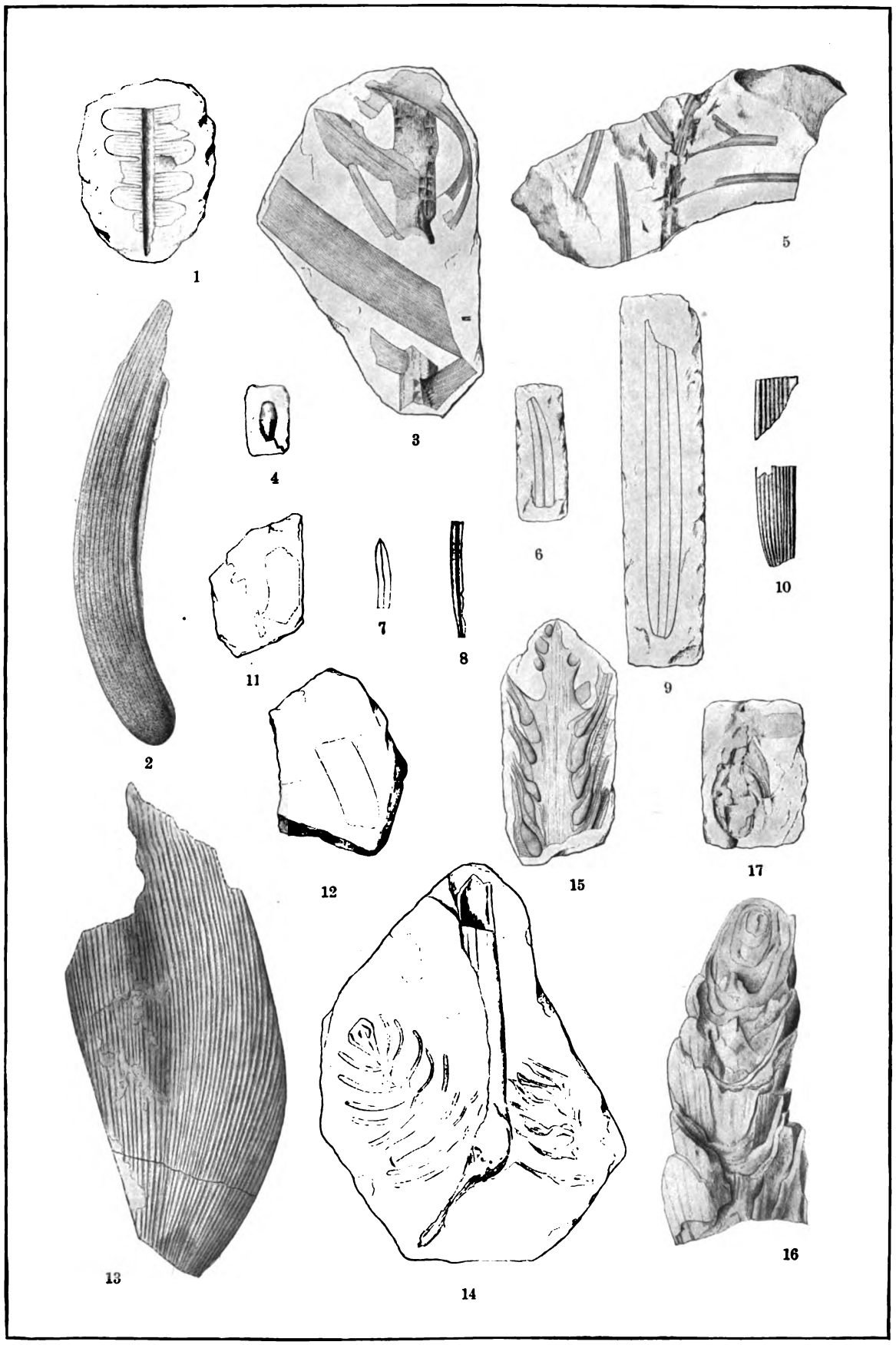

CYCADS AND CONIFERS FROM THE SHASTA FORMATION OF CALIFORNIA AND OREGON.

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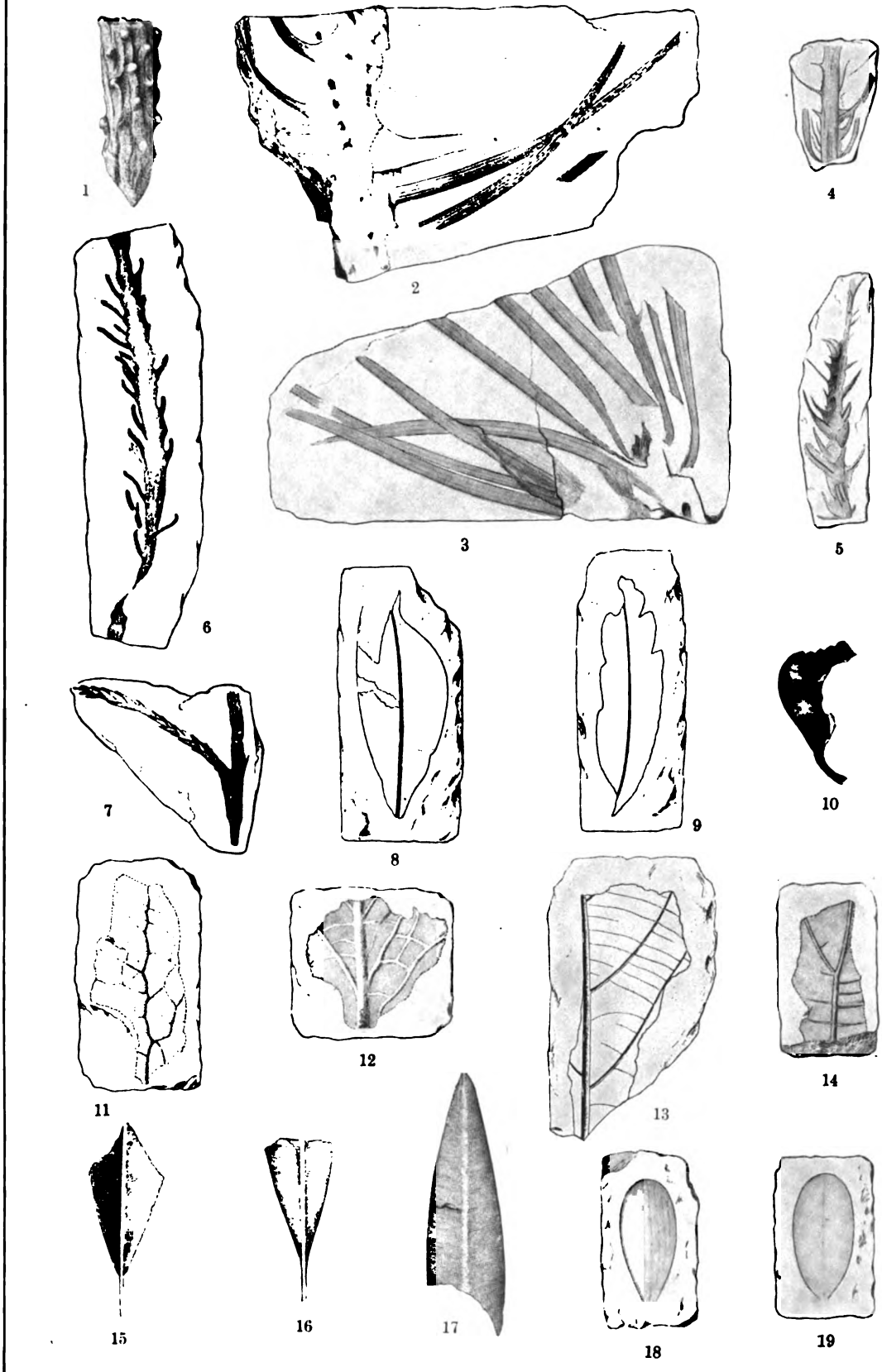

CONIFERS AND DICOTYLEDONS FROM THE SHASTA FORMATION OF CALIFORNIA AND OREGON.

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Cycadeoidea Stantoni Ward n. sp. 276

View of the best preserved side.

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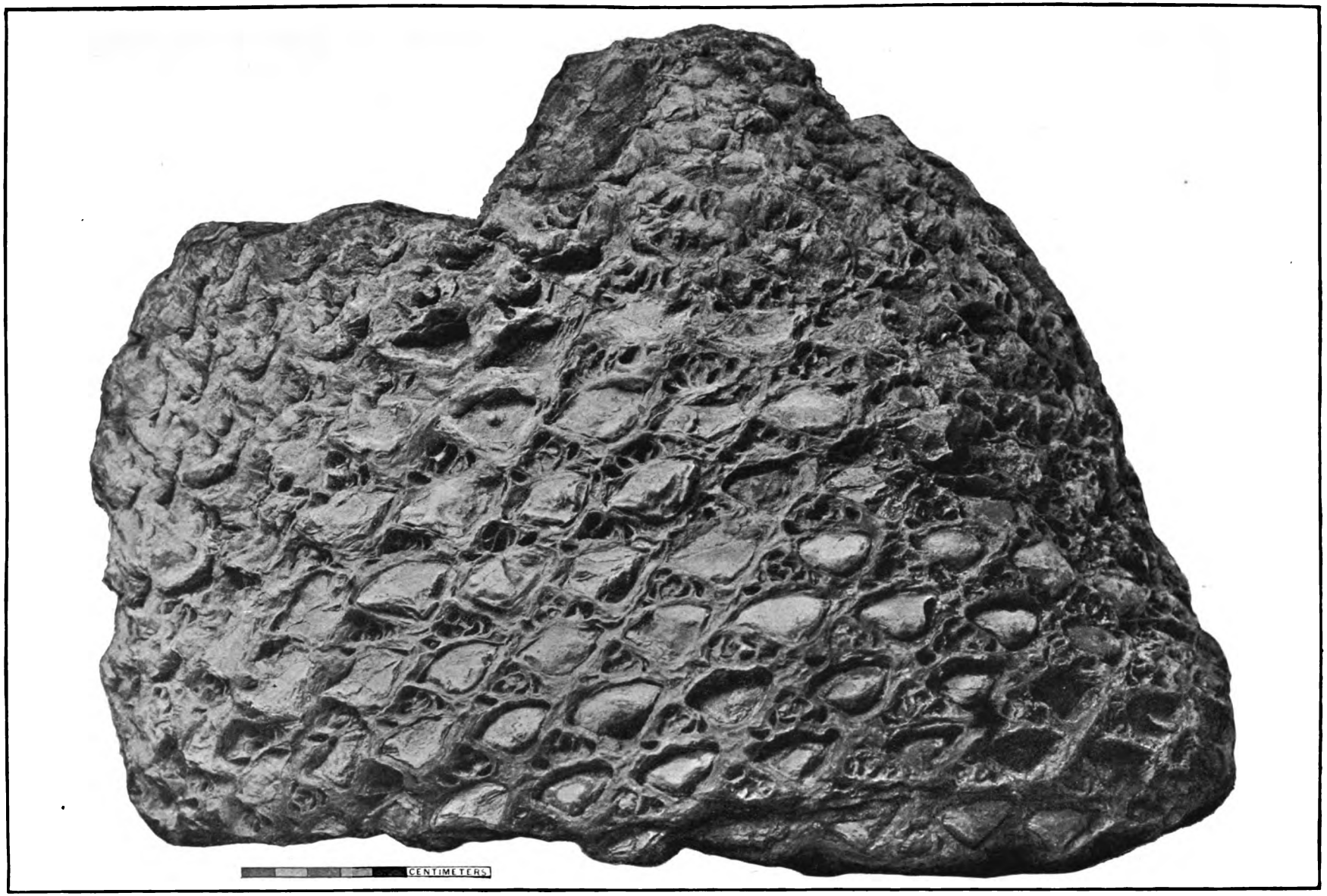

CYCADEAN TRUNK FROM THE SHASTA FORMATION OF CALIFORNIA.

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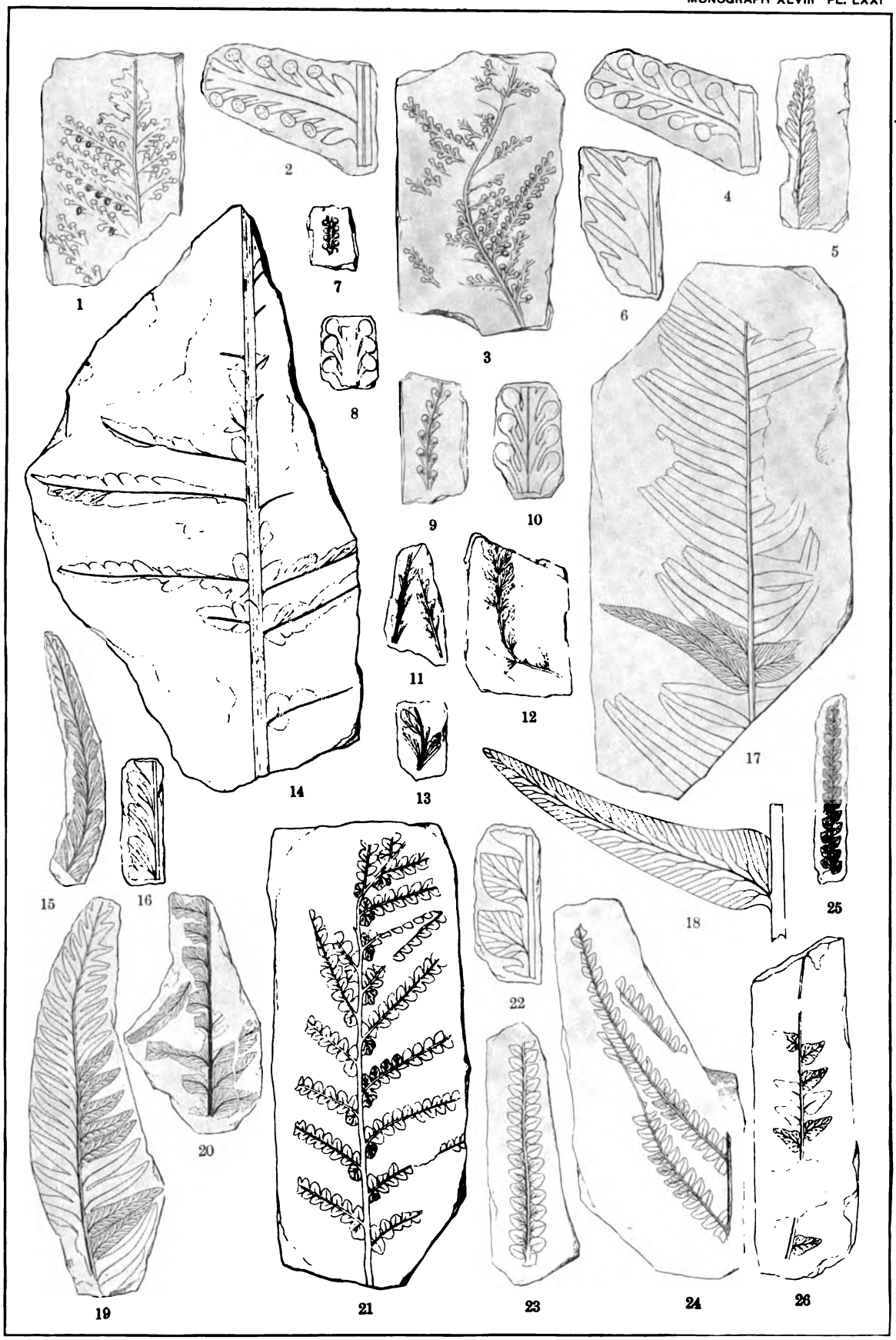

FERNS FROM THE KOOTANIE FORMATION OF MONTANA.

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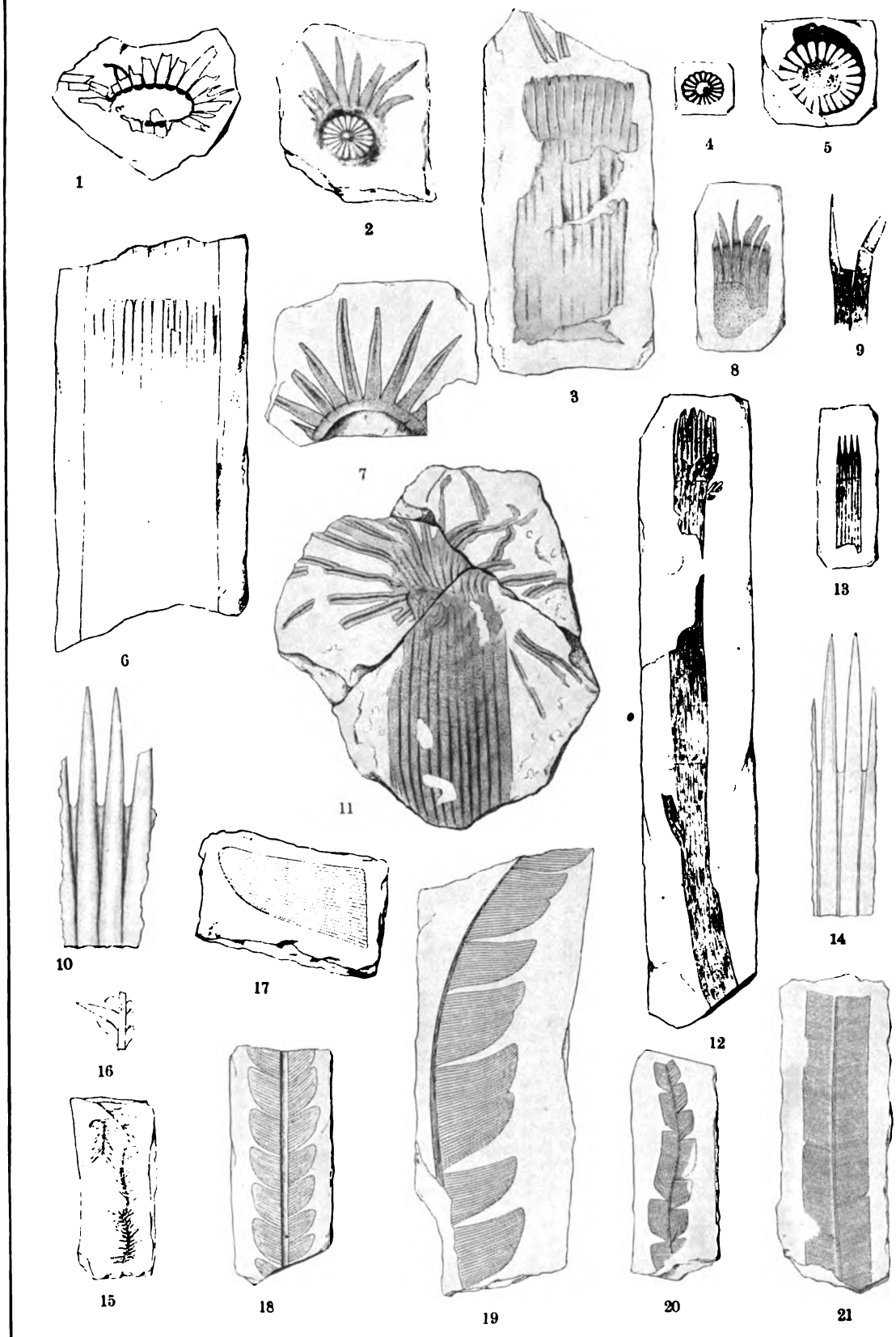

EQUISETA AND CYCADS FROM THE KOOTANIE FORMATION OF MONTANA.

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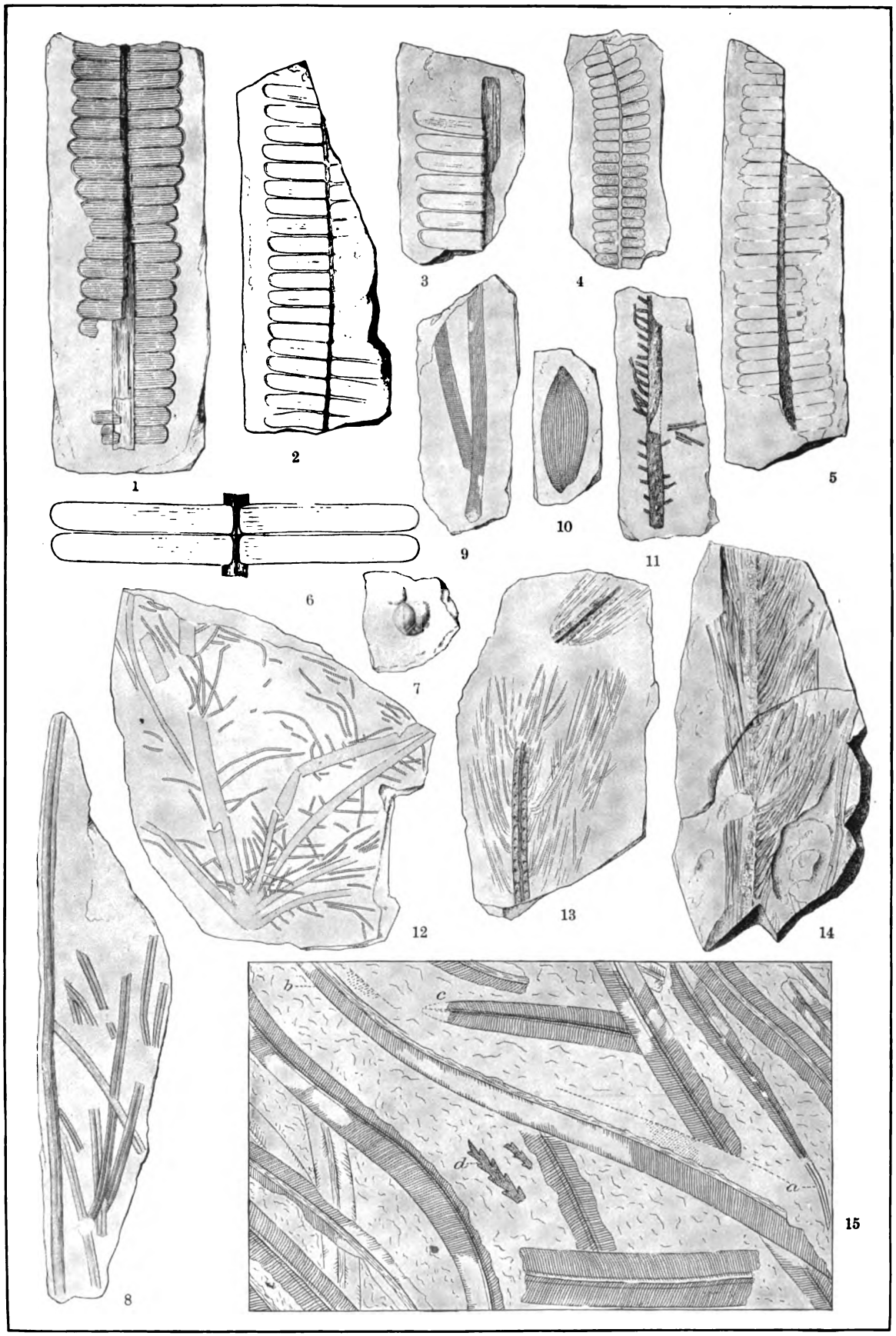

CYCADS AND CONIFERS FROM THE KOOTANIE FORMATION OF MONTANA AND THE LAKOTA FORMATION OF SOUTH DAKOTA.

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View of exposure on Ontario avenue, in rear of Lanier Heights, Washington, D. C., looking north, showing the Rappahannock sands of the Potomac formation resting on the crystalline rocks. From a photograph by the United States Geological Survey, 1892..... 382

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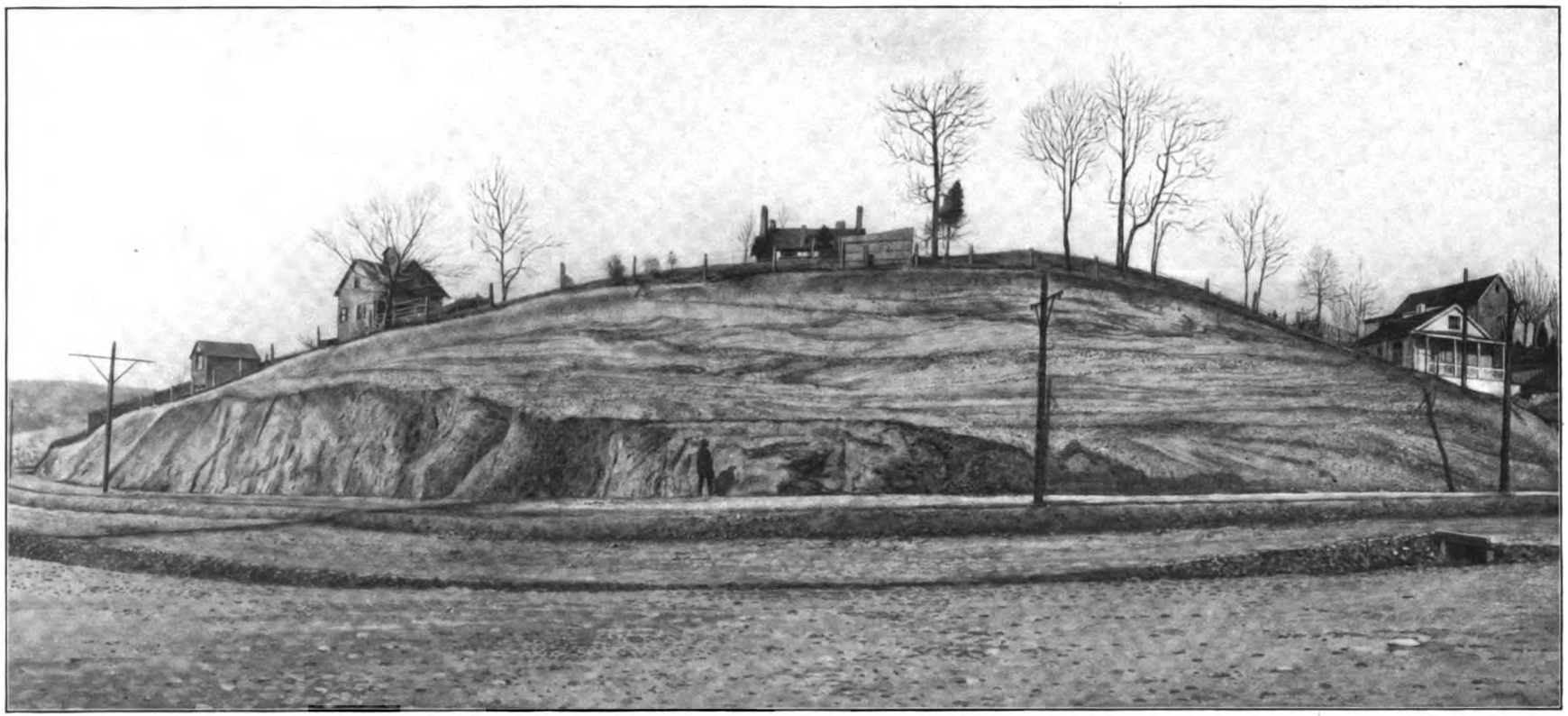

EXPOSURE OF THE POTOMAC FORMATION ON ONTARIO AVENUE, WASHINGTON, D. C.

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Exposure on Kansas avenue, between the Adams Mill road and Ontario avenue, Washington, D. C., looking east, showing the Potomac formation overlain by the Columbia bowlder clay. From a photograph by the United States Geological Survey, 1892..... 382

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EXPOSURE OF THE POTOMAC FORMATION ON KANSAS AVENUE, WASHINGTON, D. C.

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EXPOSURE OF THE POTOMAC FORMATION ON SIXTEENTH STREET, WASHINGTON, D. C.

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Exposures at Terra Cotta, D. C., in the railroad cutting looking east, showing irregularly bedded Rappahannock sands inclosing clay lenses. The two views overlap nearly half their width and represent about 100 feet from north to south, Fig. 1 being the more northerly..... 383

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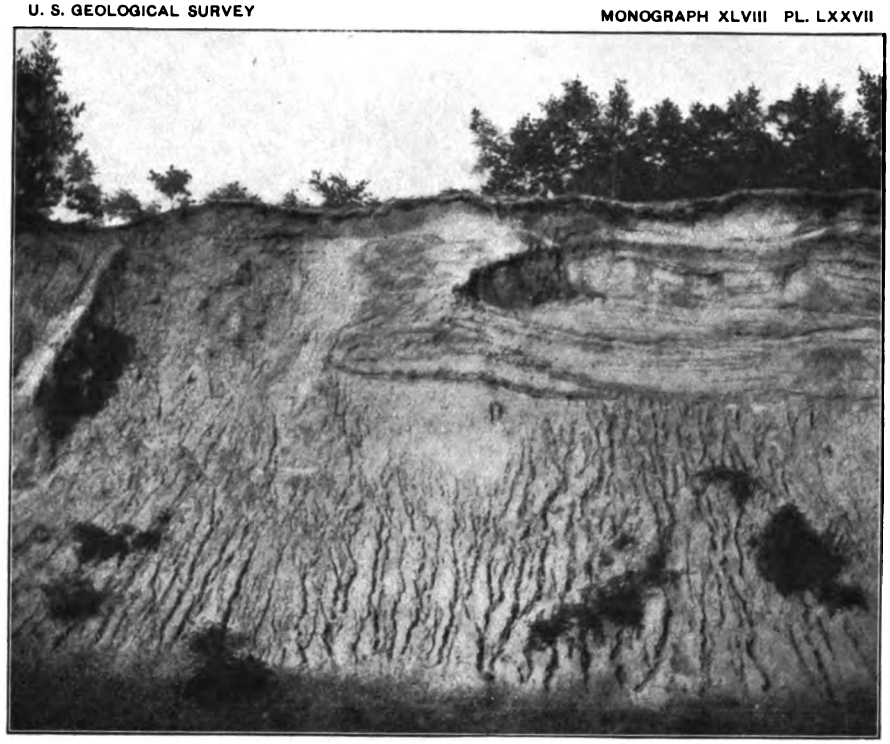

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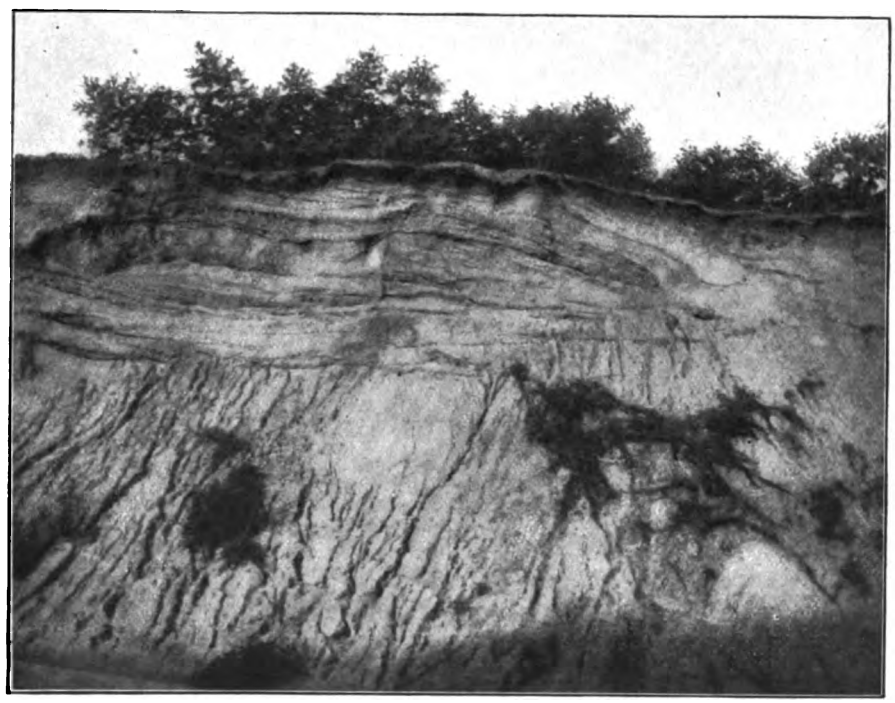

2

EXPOSURES OF THE POTOMAC FORMATION AT TERRA COTTA, D. C.

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Exposures at Freestone, Va., in railroad cutting, looking west..... 385

FIG. 1. North end of cut, showing Rappahannock sand with a stratum of green clay and below it on the right a lens of the same.

FIG. 2. South end of cut, Rappahannock sand with large lens of green clay near the top, running out on the left.

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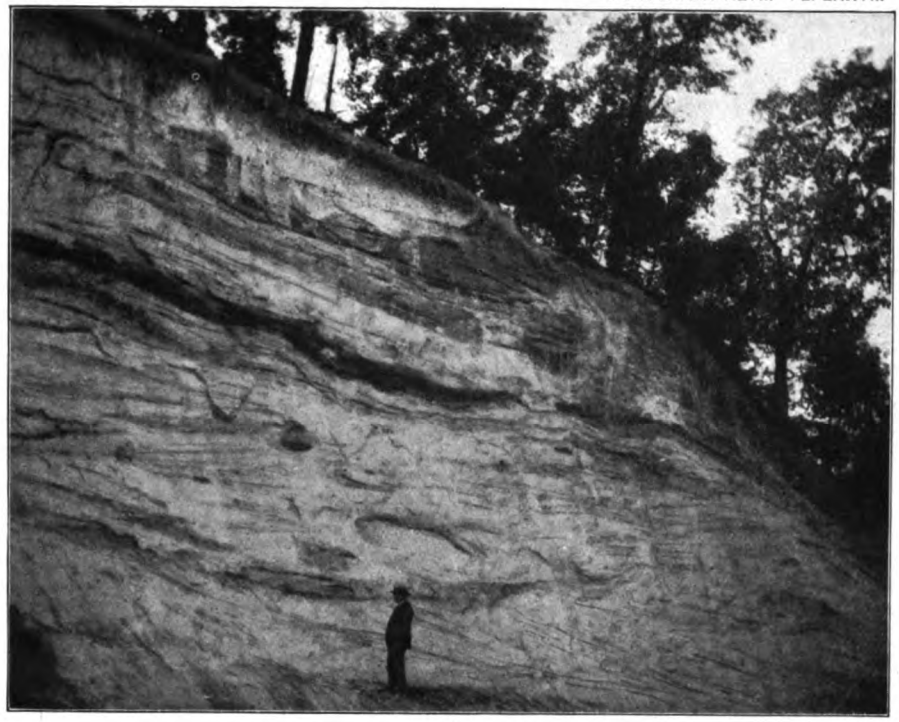

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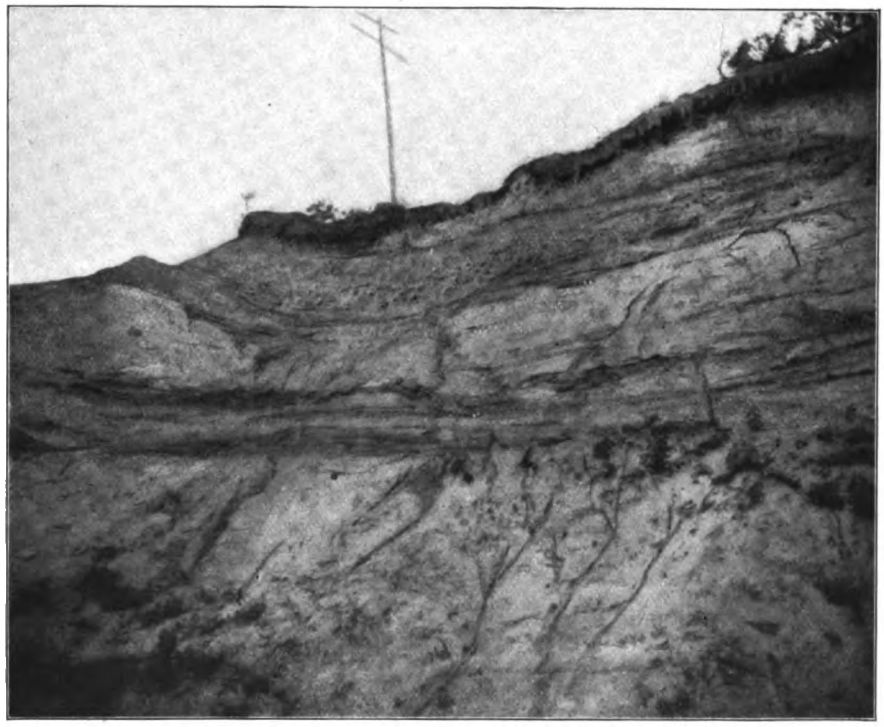

2

EXPOSURES OF THE POTOMAC FORMATION AT FREESTONE, VA.

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FIG. 1. Cross-bedded Rappahannock sands with lenses of green clay.

FIG. 2. Pure white lenticularly bedded Rappahannock sands.

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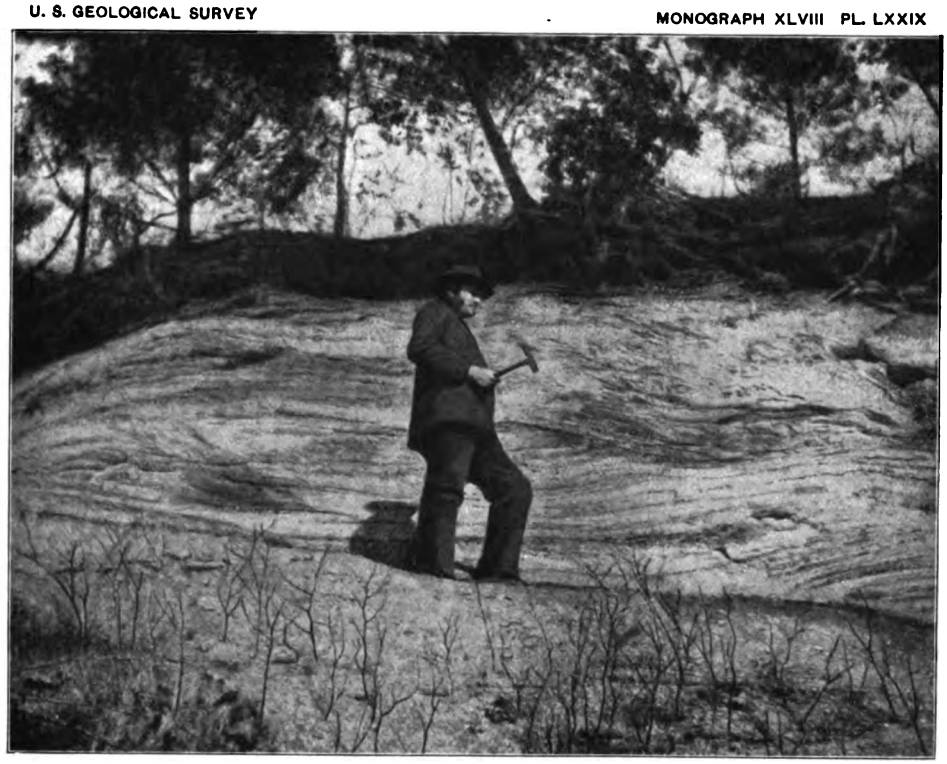

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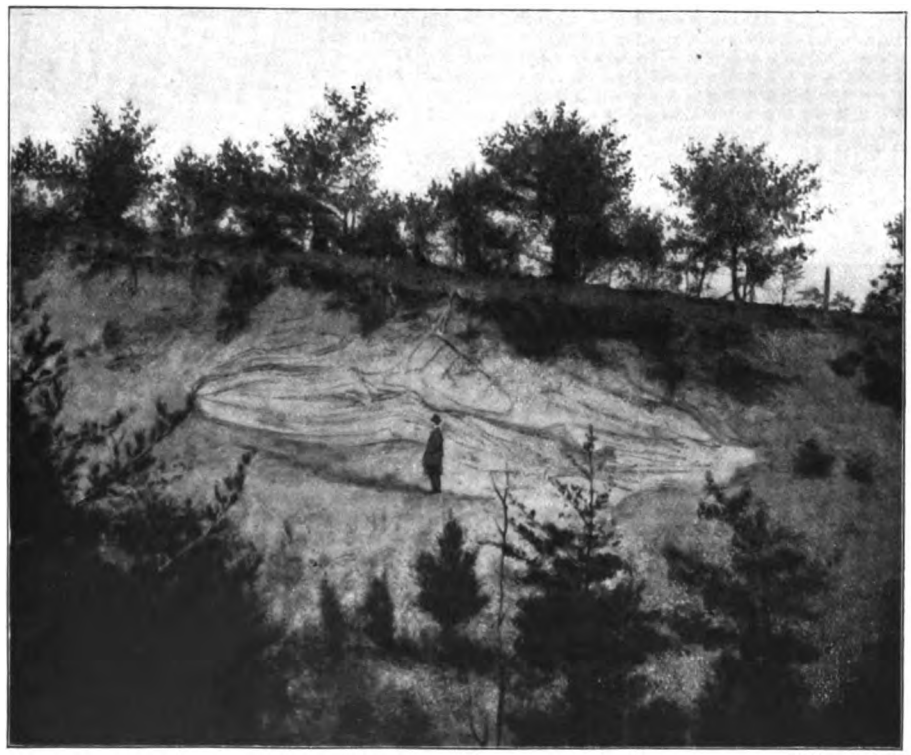

2

EXPOSURES OF THE POTOMAC FORMATION ON BACK LICK RUN, VIRGINIA.

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Map showing the distribution of the formations of the Potomac group in Maryland, the District of Columbia, and adjacent parts of Virginia, with indication, by numbers, of the localities at which fossils and other objects mentioned in the text have been found..... 412

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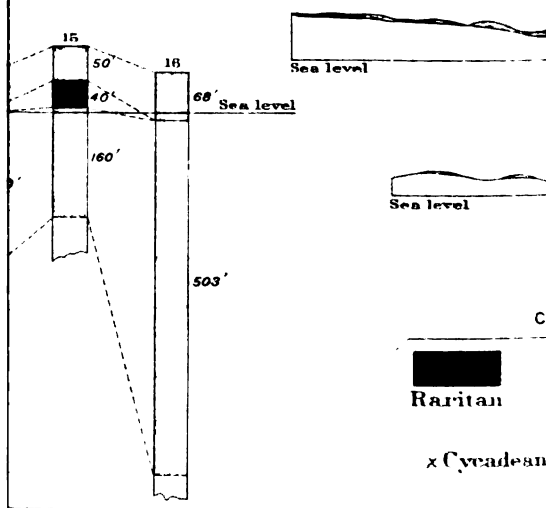

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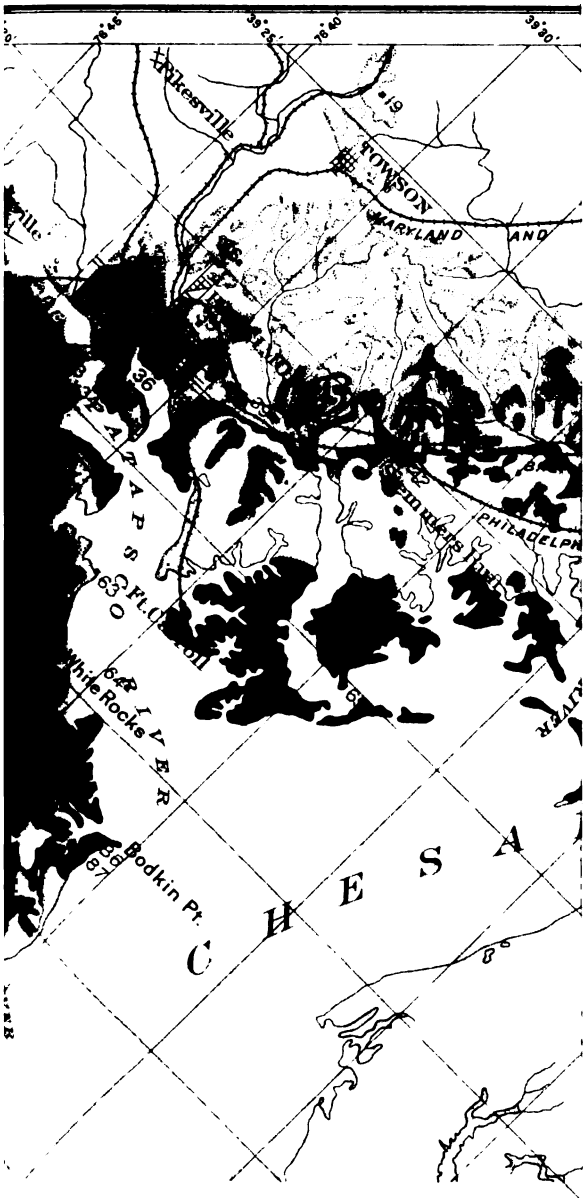

Section A-B

Burtonsville to Devils Branch

Section C-D

Cherry Hill to Chesapeake and Delaware Ca

LEGEND

CEOUS JUR

Patapsco

Arundel

unks ○ Fossil etc. localities ▪ Oth

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PLATE LXXXI.

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PLATE LXXXI.

Maryland Potomac Cycads.

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Cycadeoidea marylandica (Font.) Cap. & Solms. Side and base view of the Johns Hopkins University Cycad, No. 1: also of silicified wood from the Potomac formation of Maryland, from a photograph by Tyson..... 419

(For historical account, see p. 410.)

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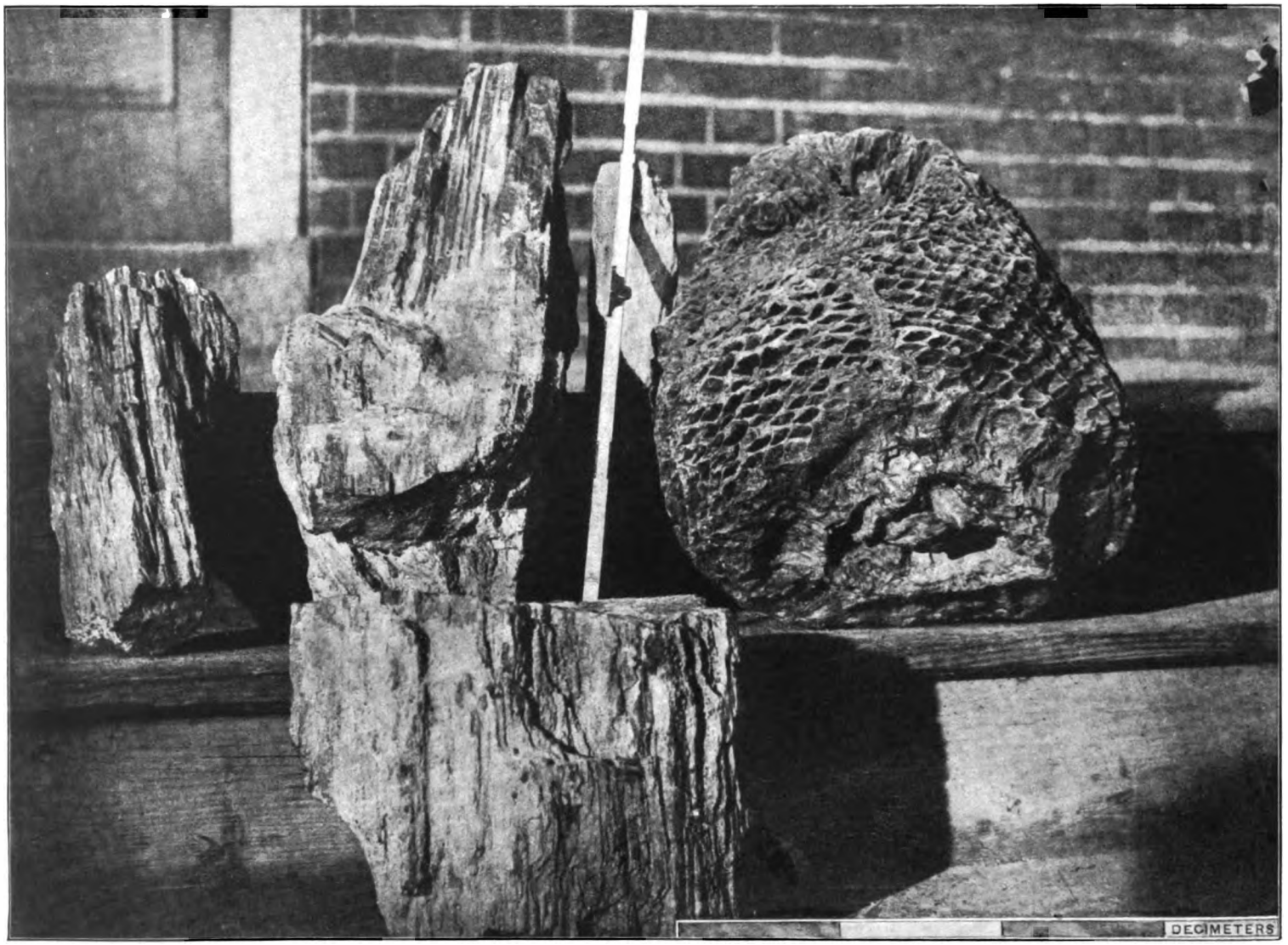

CYCAD TRUNK AND SILICIFIED WOOD FROM THE POTOMAC FORMATION OF MARYLAND.

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PLATE LXXXII.

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PLATE LXXXII.

Maryland Potomac Cycads.

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Cycadeoidea marylandica (Font.) Cap. & Solms. View of Johns Hopkins University Cycad, No. 2, from a photograph by Tyson..... 421

(For historical account, see p. 410.)

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TRUNK OF CYCAD EARLY DISCOVERED IN THE POTOMAC FORMATION OF MARYLAND.

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MARYLAND POTOMAC CYCADS.

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FIGS. 1–3. Group of cycads, from a photograph by Tyson (for historical account, see p. 414).

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View of the base of the Link trunk, No. 1481, of the museum of the Woman's College of Baltimore..... 422

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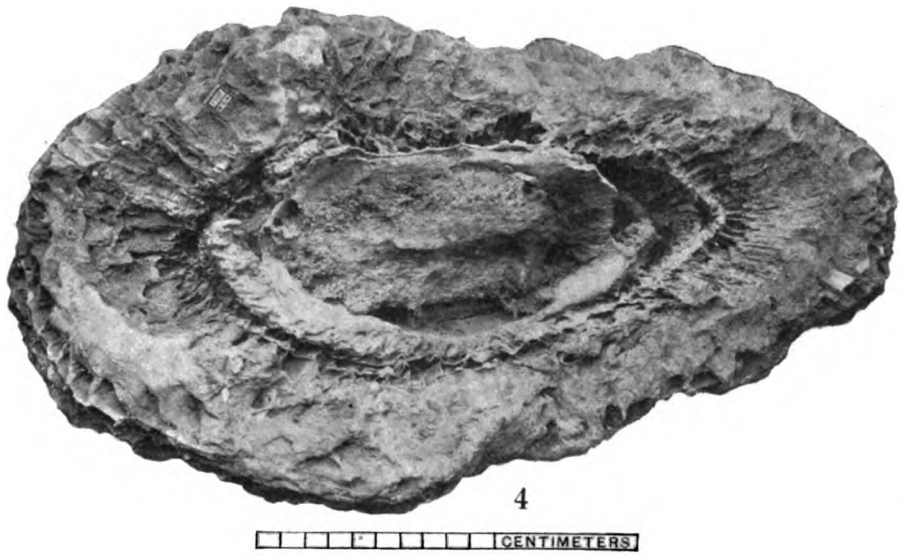

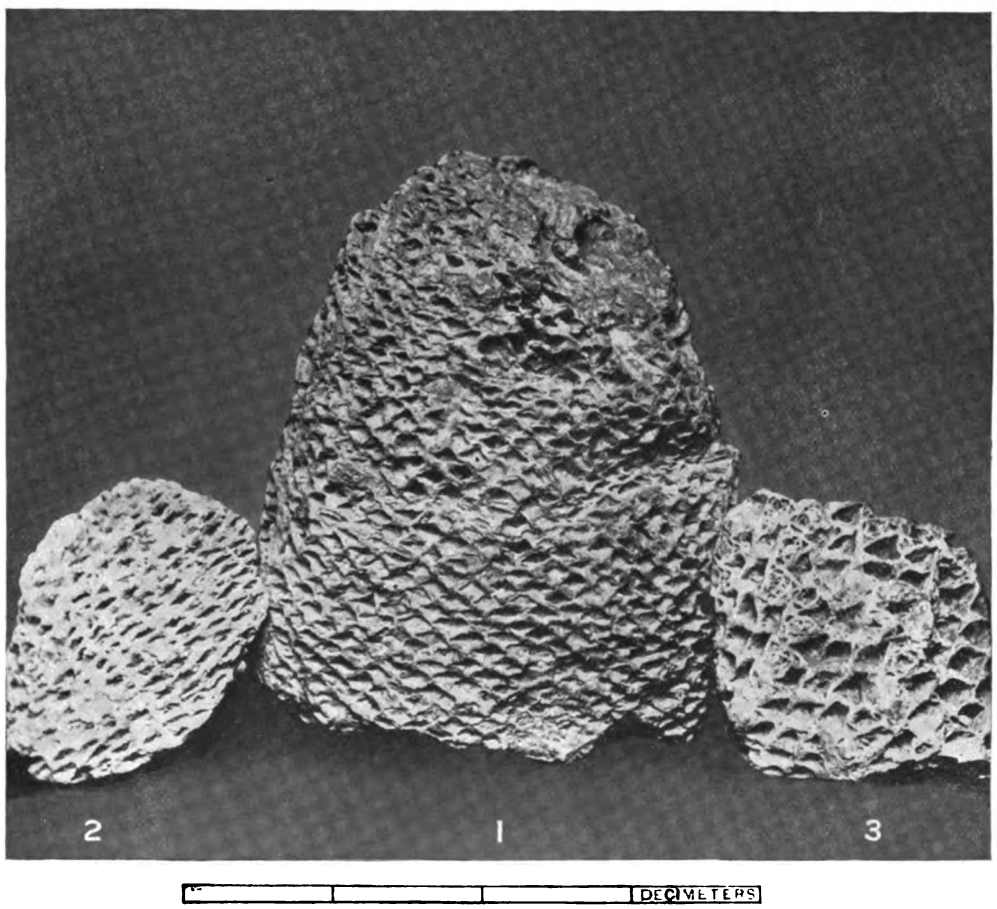

TRUNKS OF CYCADS EARLY DISCOVERED IN THE POTOMAC FORMATION OF MARYLAND.

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PLATE LXXXIV.

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PLATE LXXXIV.

Maryland Potomac Cycads.

Group of cycads in the museum of the Johns Hopkins University, Baltimore.

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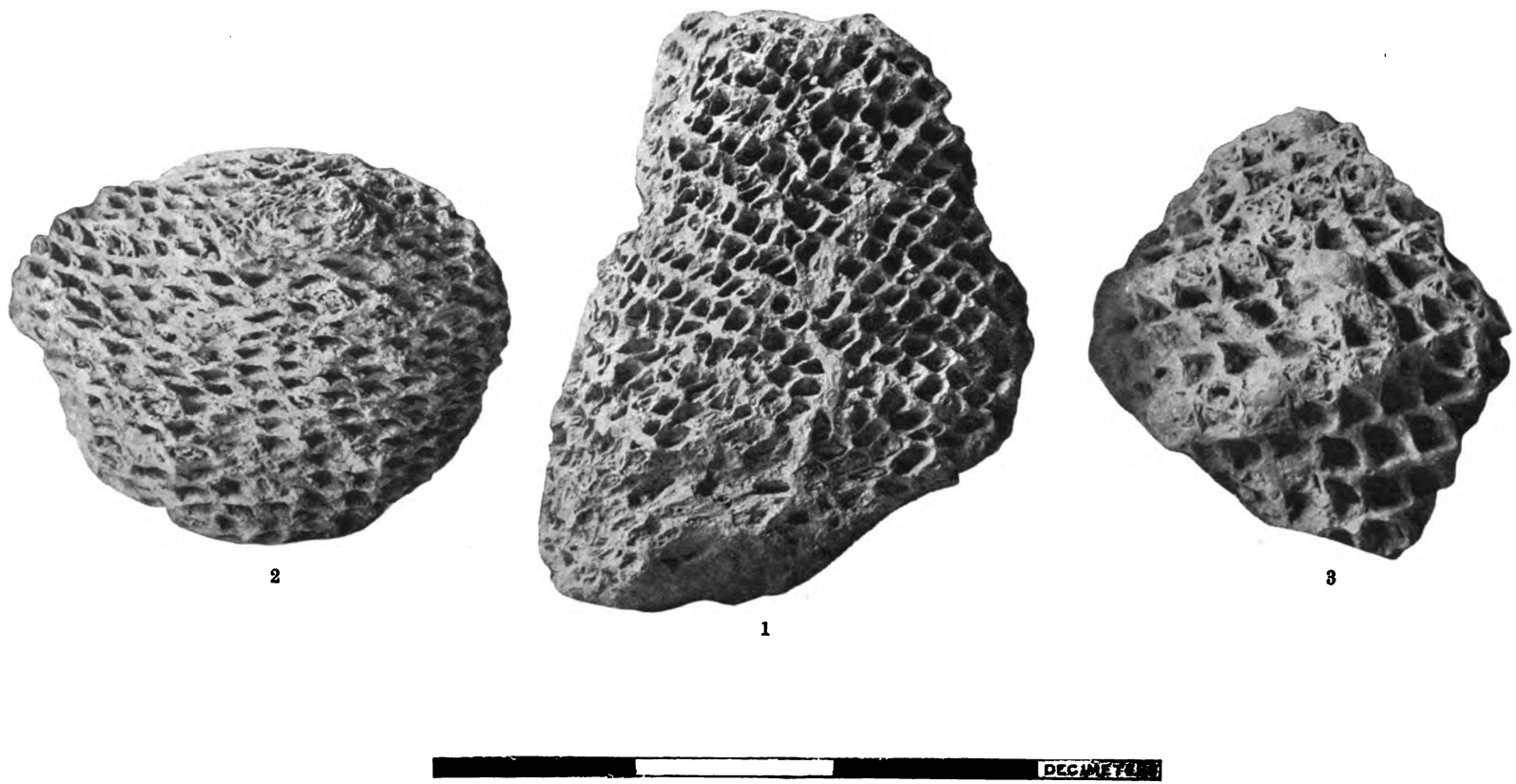

TRUNKS OF CYCADS EARLY DISCOVERED IN THE POTOMAC FORMATION OF MARYLAND.

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PLATE LXXXV.

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Maryland Potomac Cycads.

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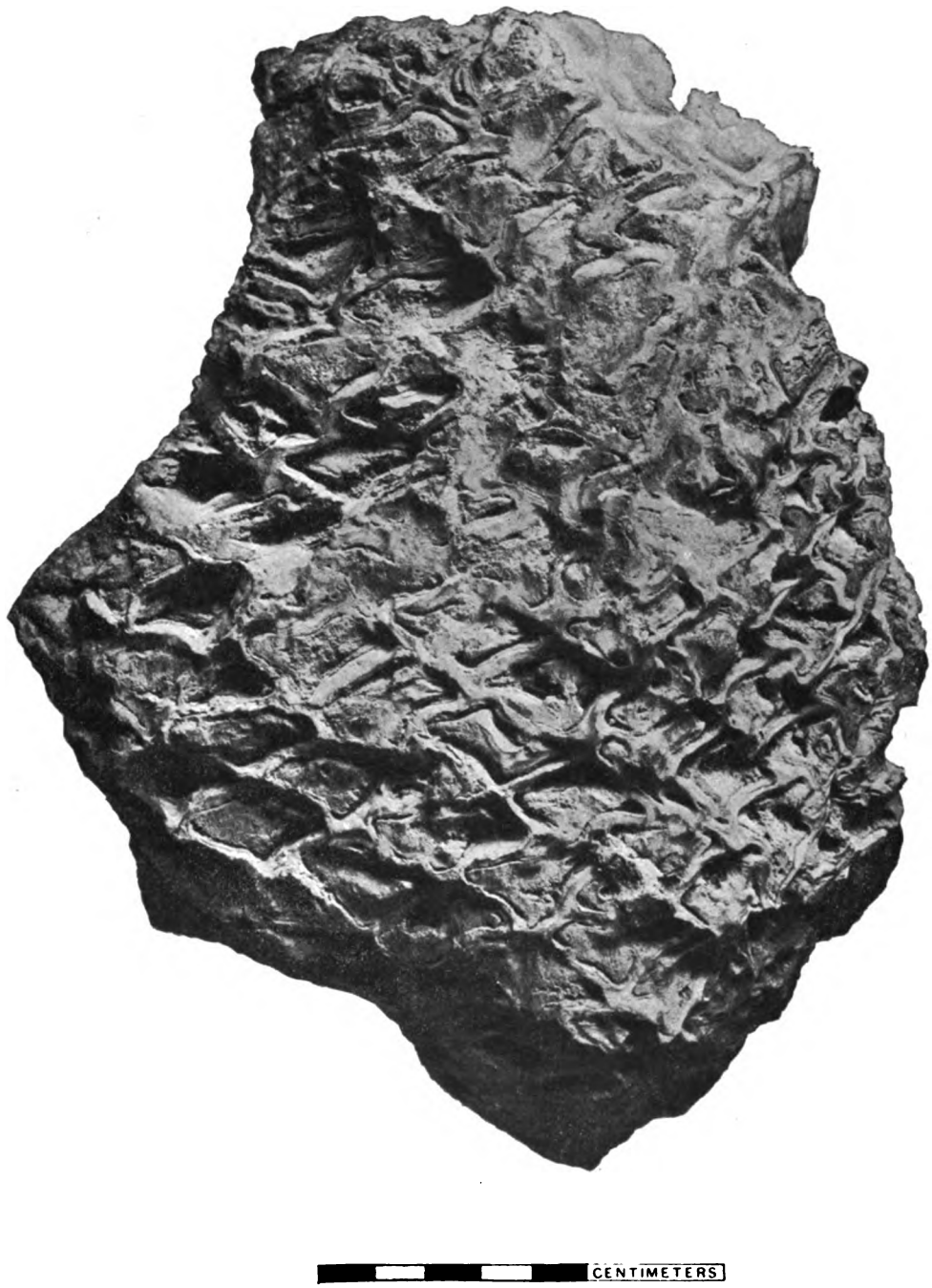

TRUNK OF CYCAD EARLY DISCOVERED IN THE POTOMAC FORMATION OF MARYLAND.

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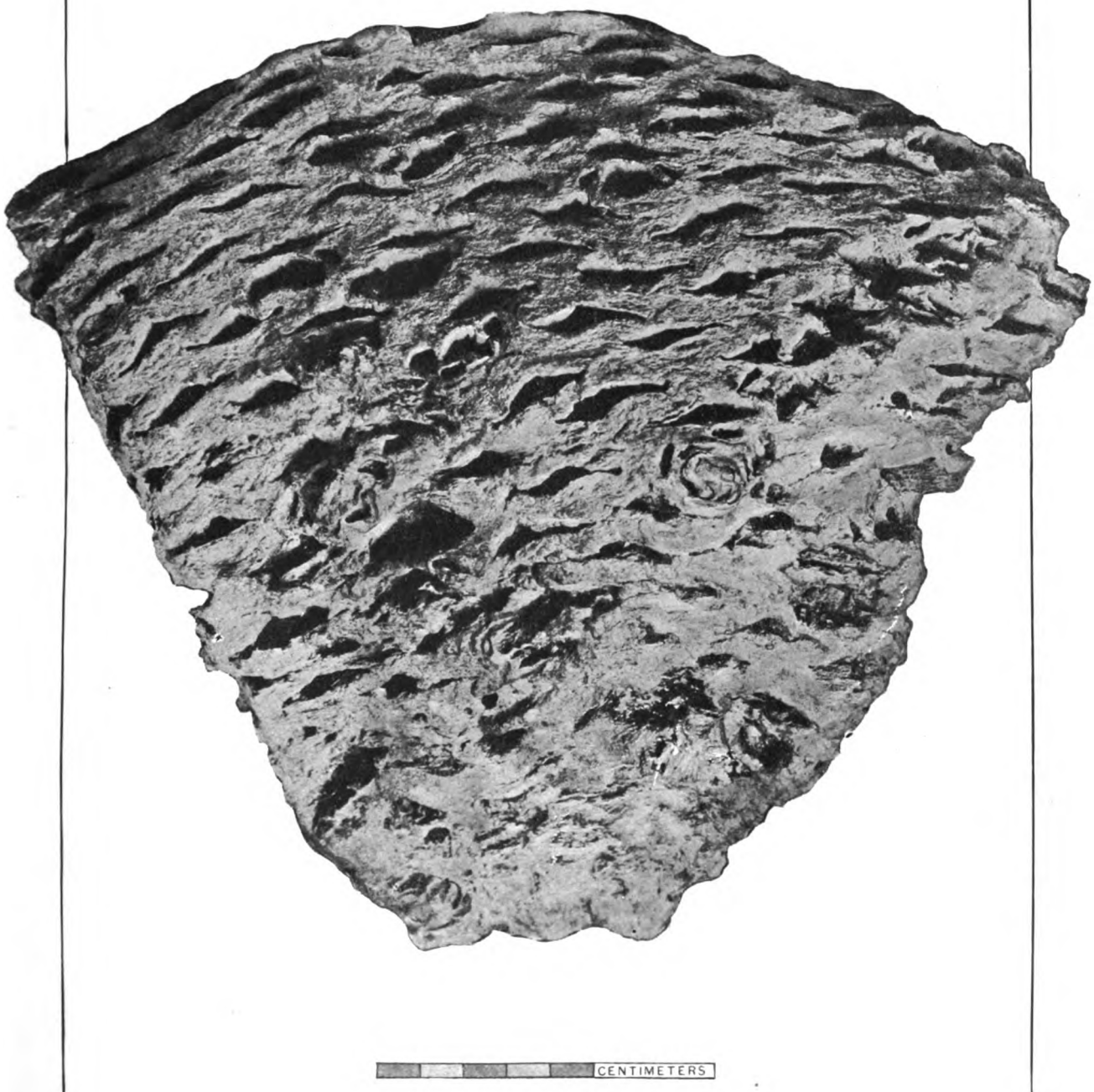

TRUNK OF CYCAD EARLY DISCOVERED IN THE POTOMAC FORMATION OF MARYLAND.

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PLATE LXXXVII.

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PLATE LXXXVII.

MARYLAND POTOMAC CYCADS.

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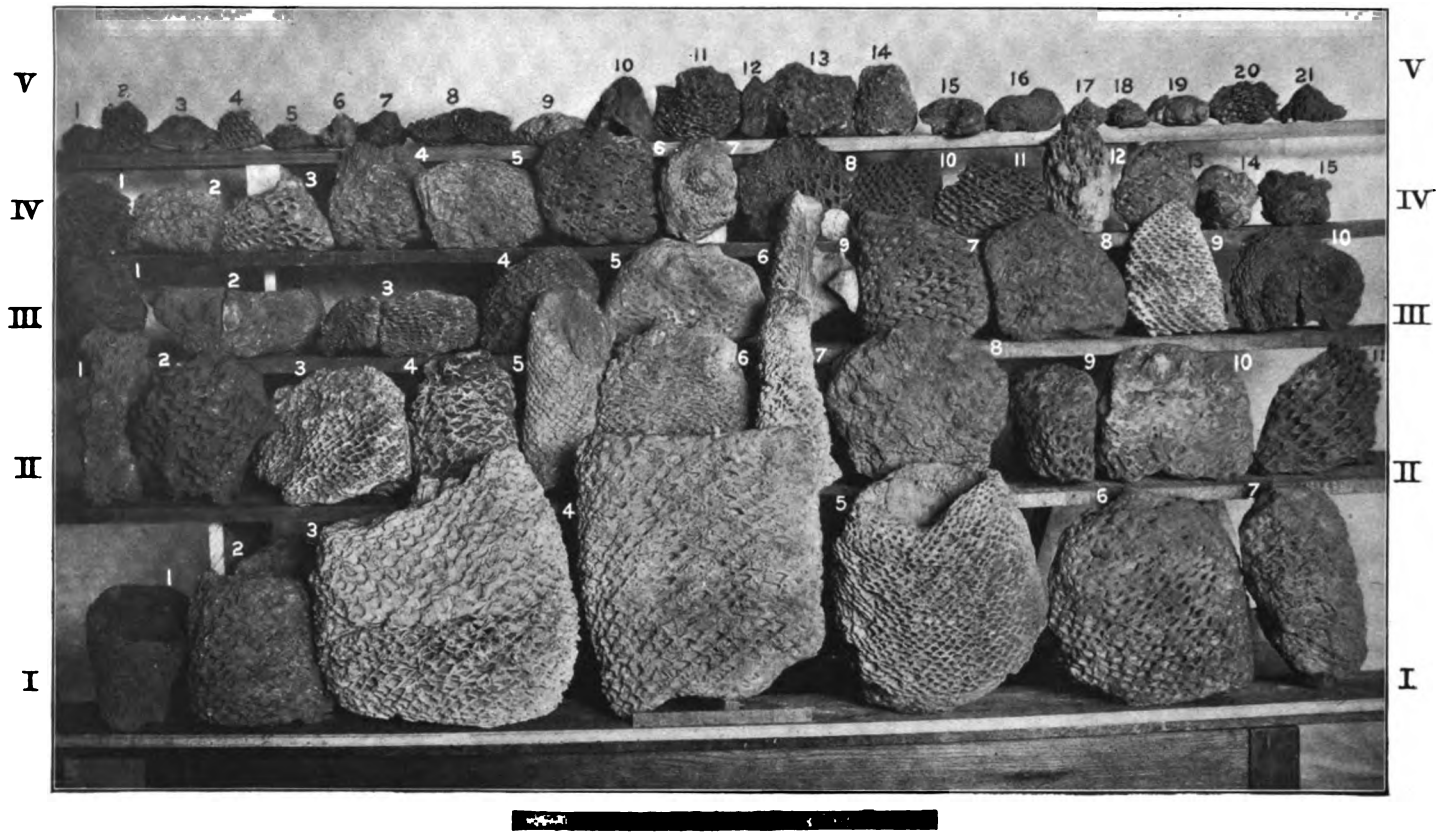

GROUP OF CYCADS IN THE MUSEUM OF THE WOMAN'S COLLEGE OF BALTIMORE.

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PLATE LXXXVIII.

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PLATE LXXXVIII.

Maryland Potomac Cycads.

Cycadeoidea marylandica (Font.) Cap. & Solms. Page.

View of the Link trunk, No. 1481, of the museum of the Woman's College of Baltimore, restored to its place in the Link Gulch, near Arbutus, Maryland, also showing the exposure as seen from the west side, looking across the gulch 429

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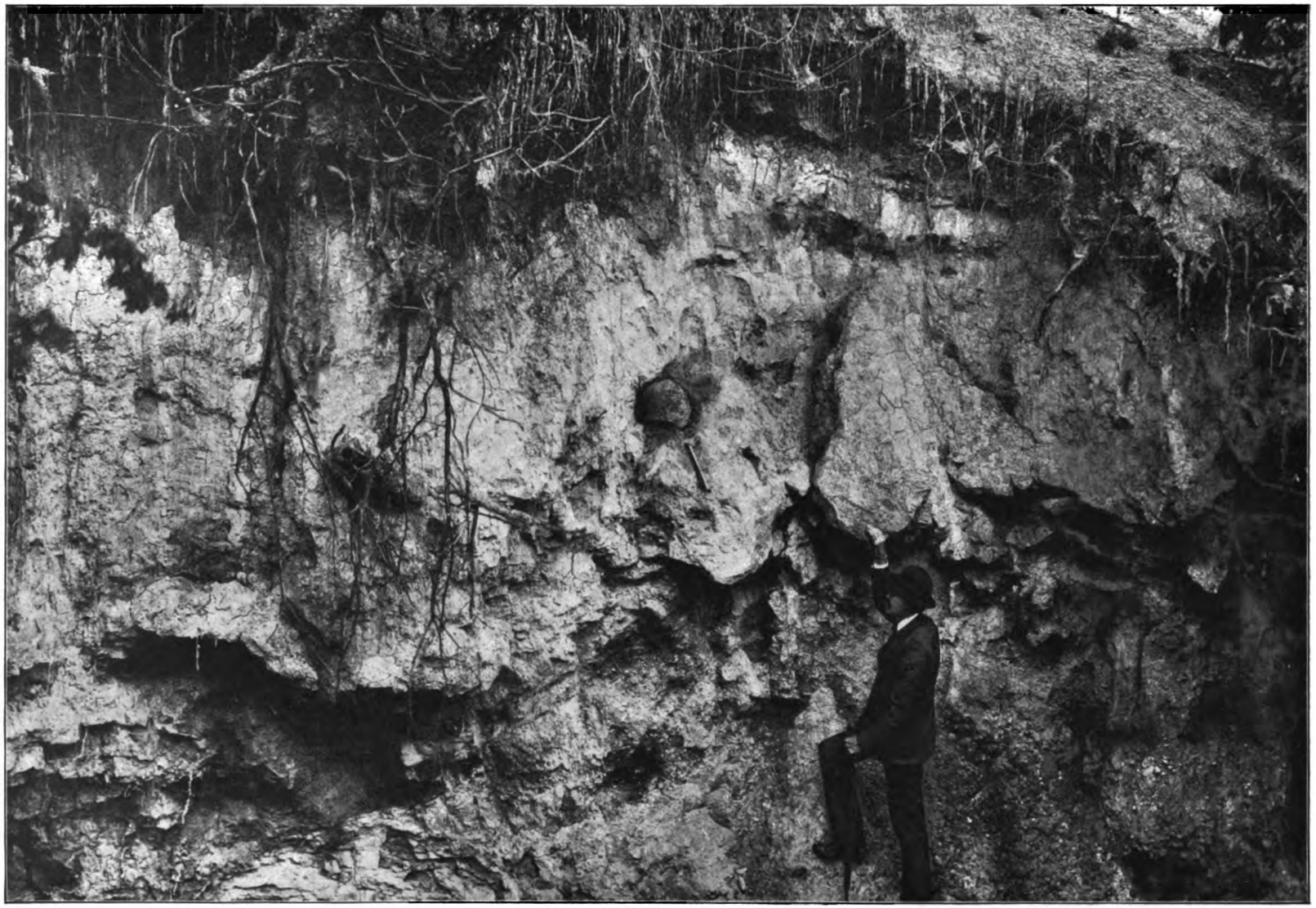

LINK GULCH WITH THE LINK CYCAD IN PLACE.

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PLATE LXXXIX.

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PLATE LXXXIX.

Maryland Potomac Cycads.

Group of Cycads in the museum of the Woman's College of Baltimore.

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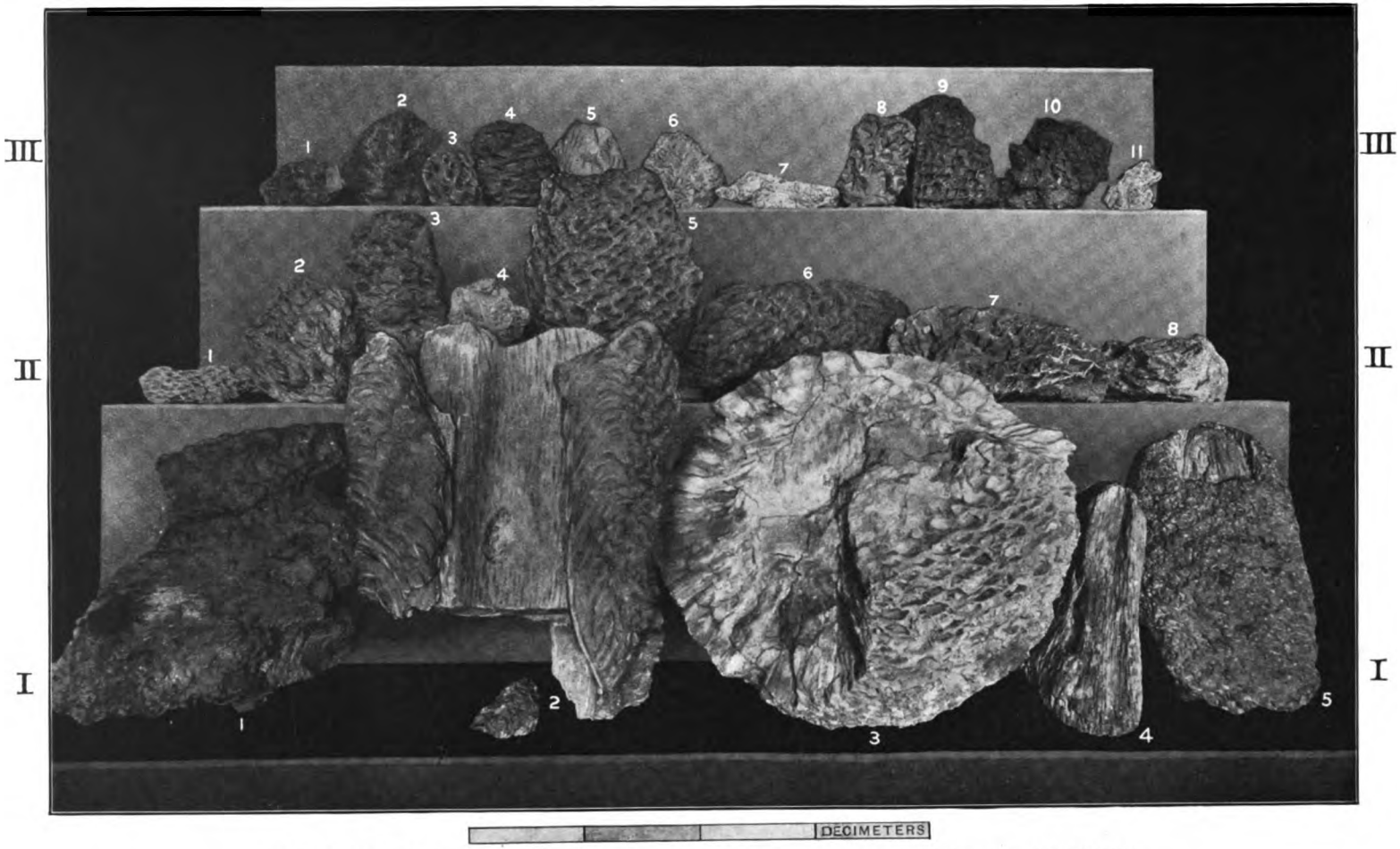

GROUP OF CYCADS IN THE MUSEUM OF THE WOMAN'S COLLEGE OF BALTIMORE.

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Maryland Potomac Cycads.

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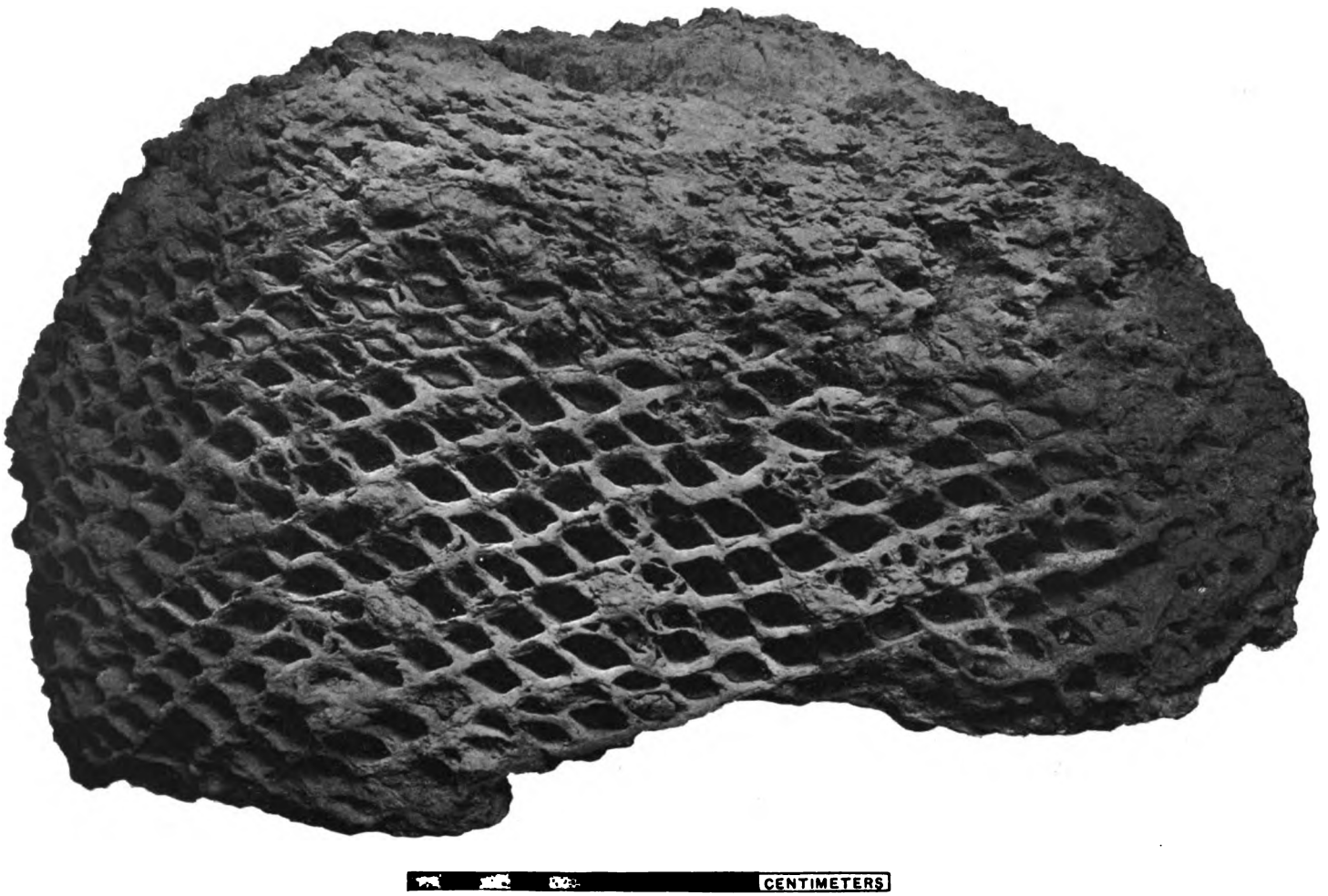

CYCADEOIDEA MARYLANDICA.

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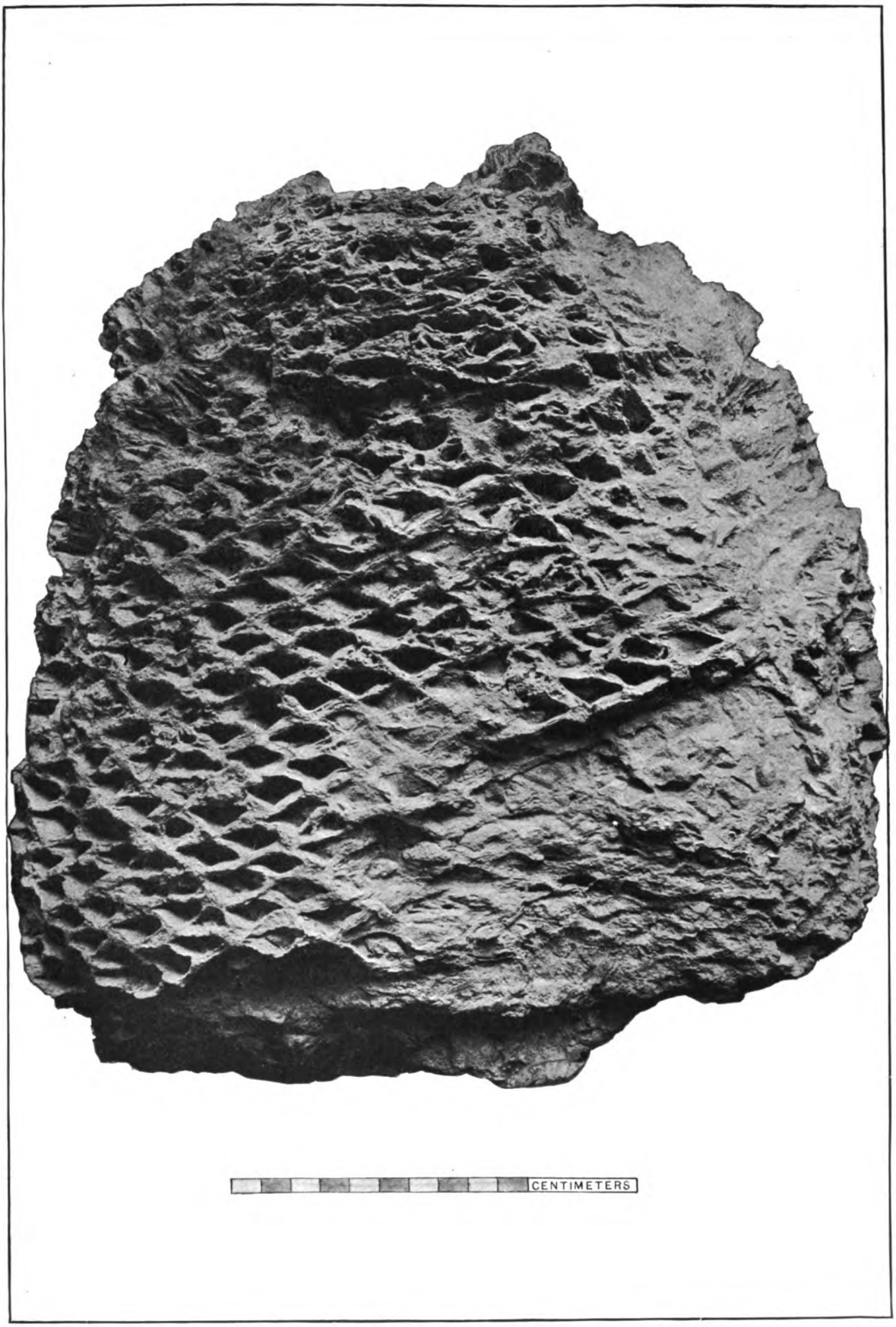

CYCADEOIDEA MARYLANDICA.

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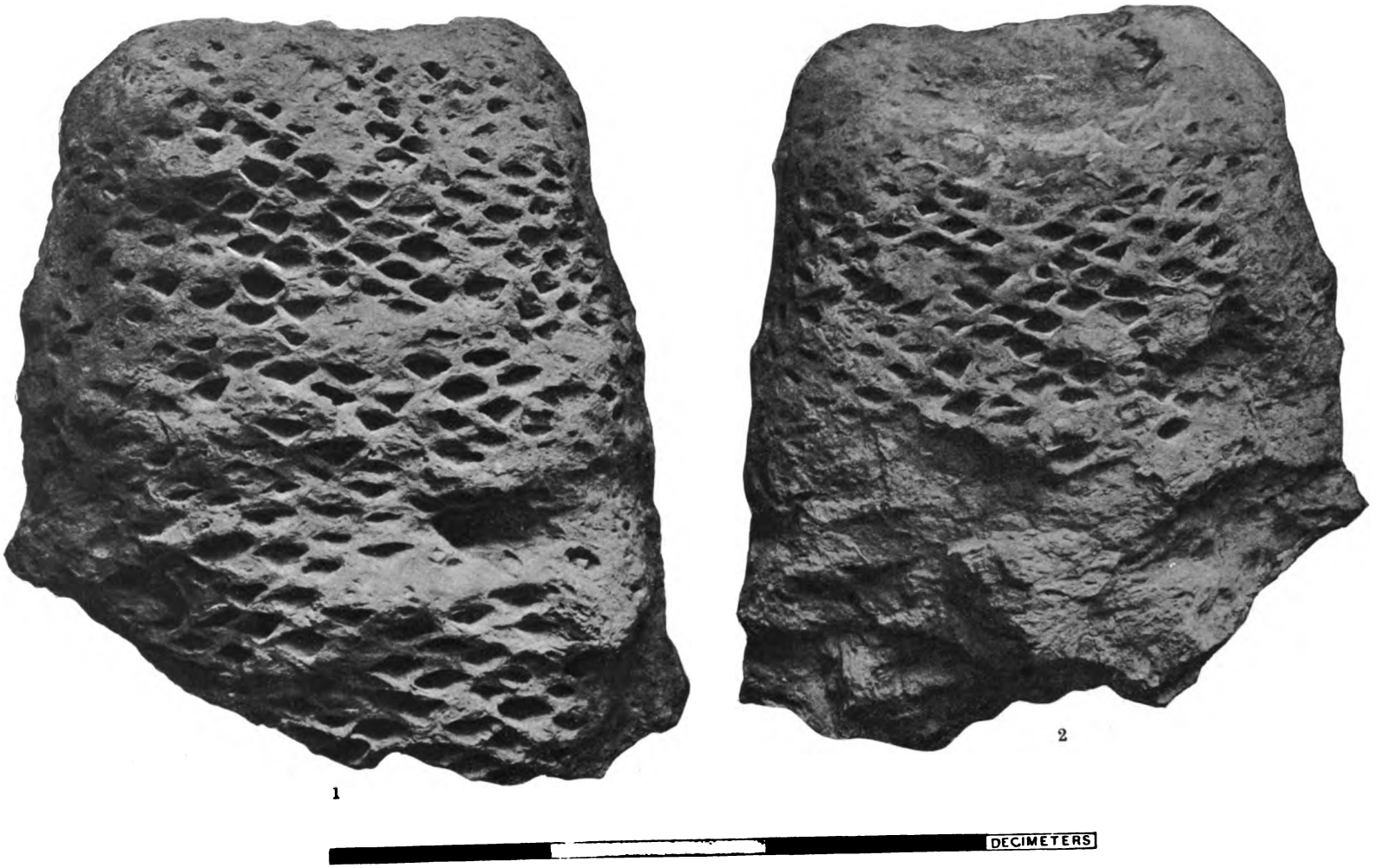

CYCADEOIDEA MARYLANDICA.

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Maryland Potomac Cycads.

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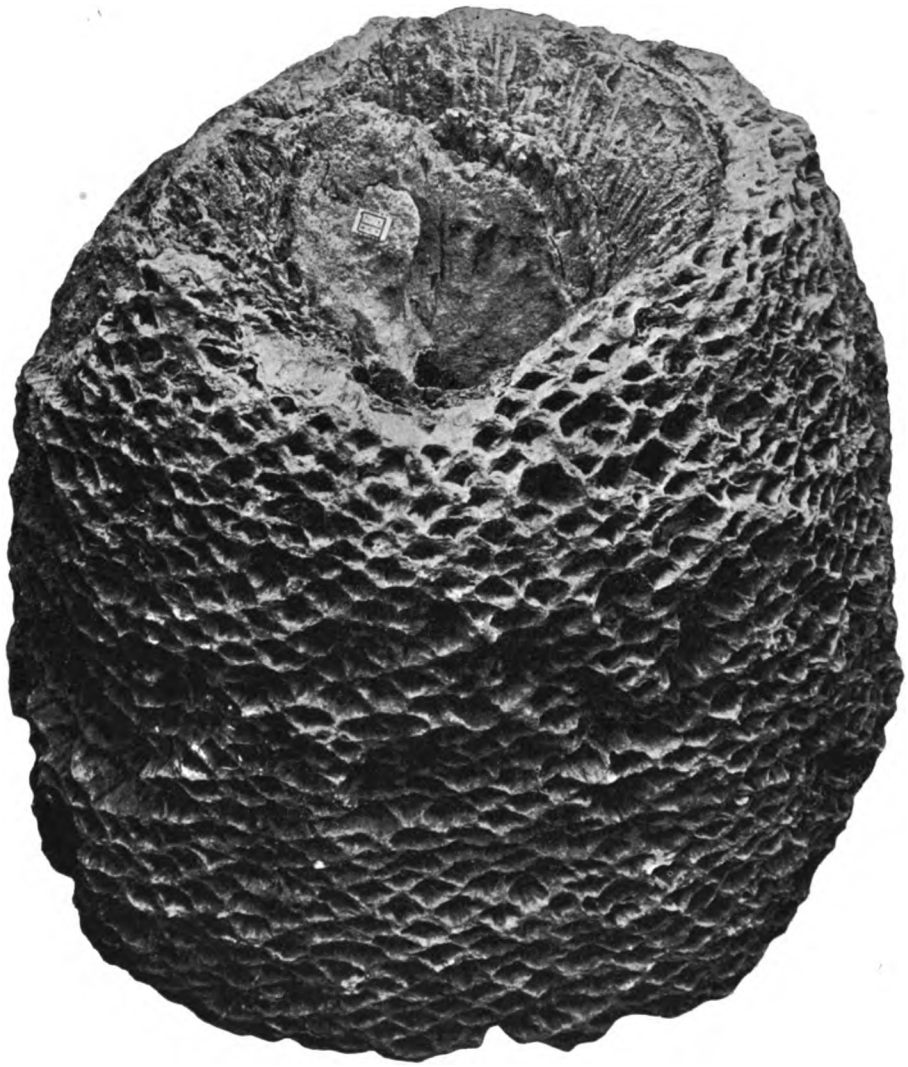

CENTIMETERS

CYCADEOIDEA TYSONIANA.

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PLATE XCIV.

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PLATE XCIV.

MARYLAND POTOMAC CYCADS.

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CYCADEOIDEA MCGEEANA.

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Maryland Potomac Cycads.

Cycadeoidea Fontaineana Ward. Page

View of the top of the Turner trunk or "Chicken trough," No. 3046 of the museum of the Woman's College of Baltimore, showing the deep cavity or "crow's nest" used as a receptacle for water for domestic fowls 447

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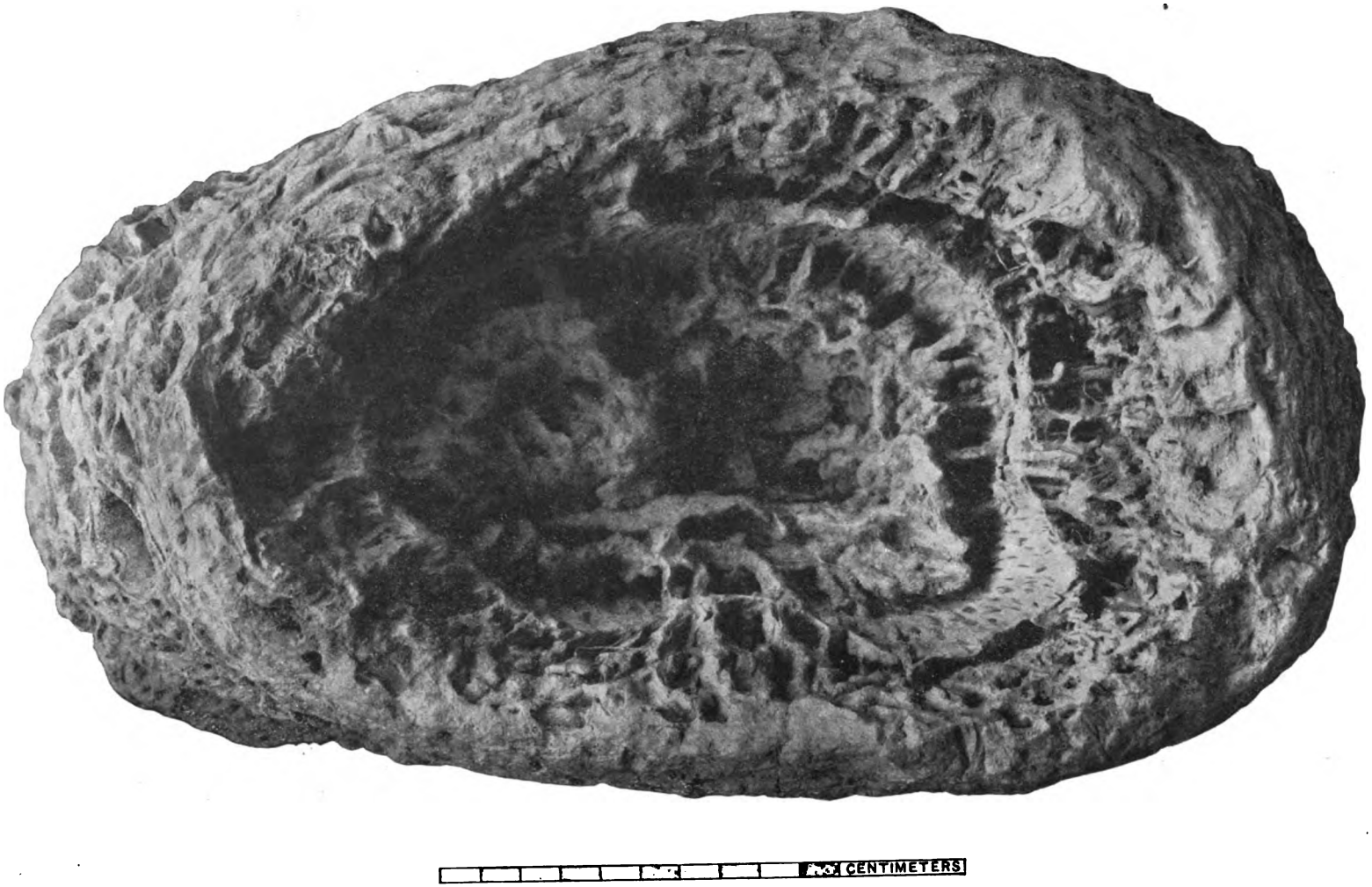

CYCADEOIDEA FONTAINEANA.

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PLATE XCVI.

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PLATE XCVI.

Maryland Potomac Cycads.

Cycadeoidea Fontaineana Ward. Page.

Longitudinal section through the Griffith trunk, No. 1467 of the museum of the Woman's College of Baltimore, showing the internal structure and terminal bud..... 447

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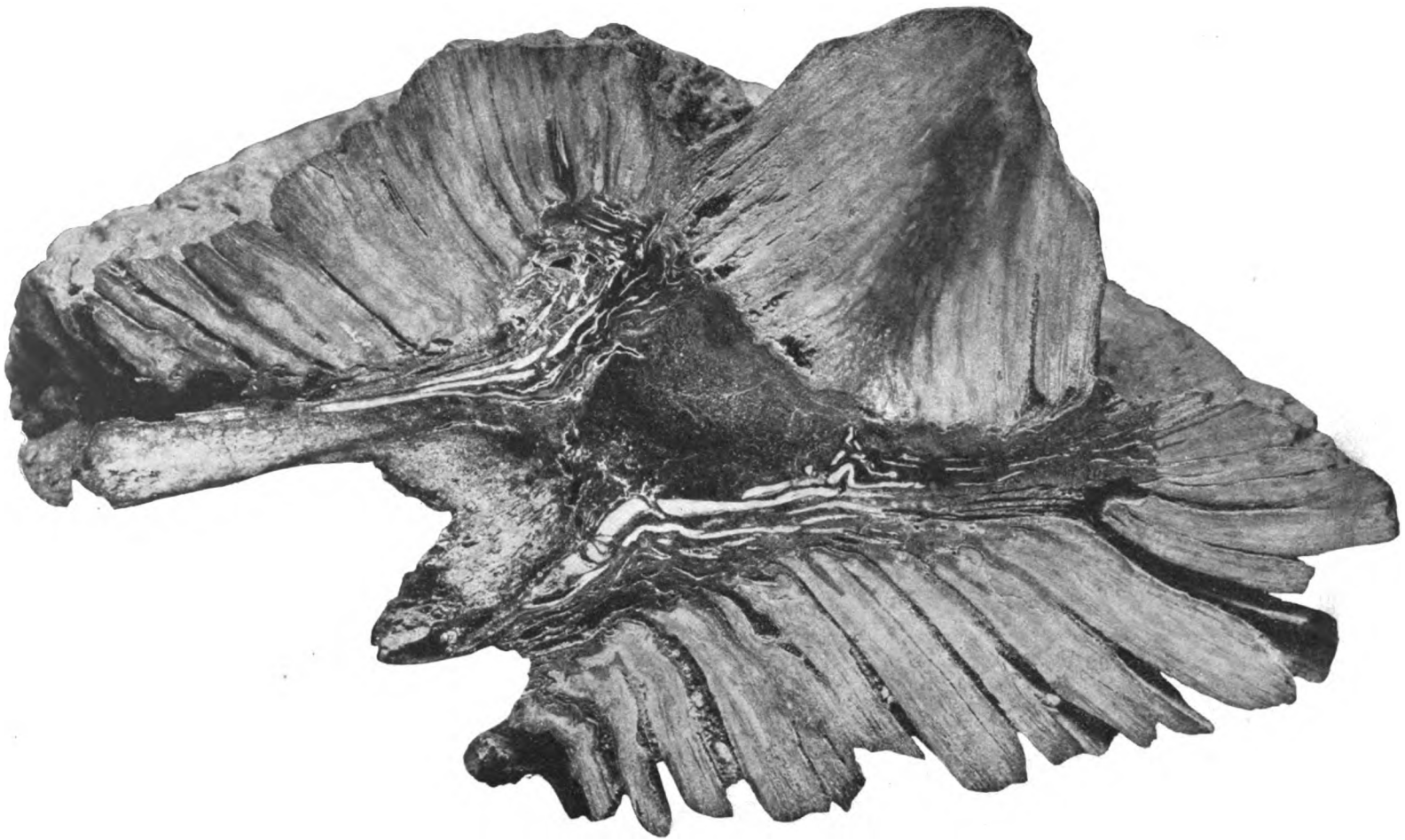

CYCADEOIDEA FONTAINEANA.

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PLATE XCVII.

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Maryland Potomac Cycads.

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CYCADEOIDEA FONTAINEANA.

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MARYLAND POTOMAC CYCADS..

CYCADEOIDEA FONTAINEANA Ward. Page.

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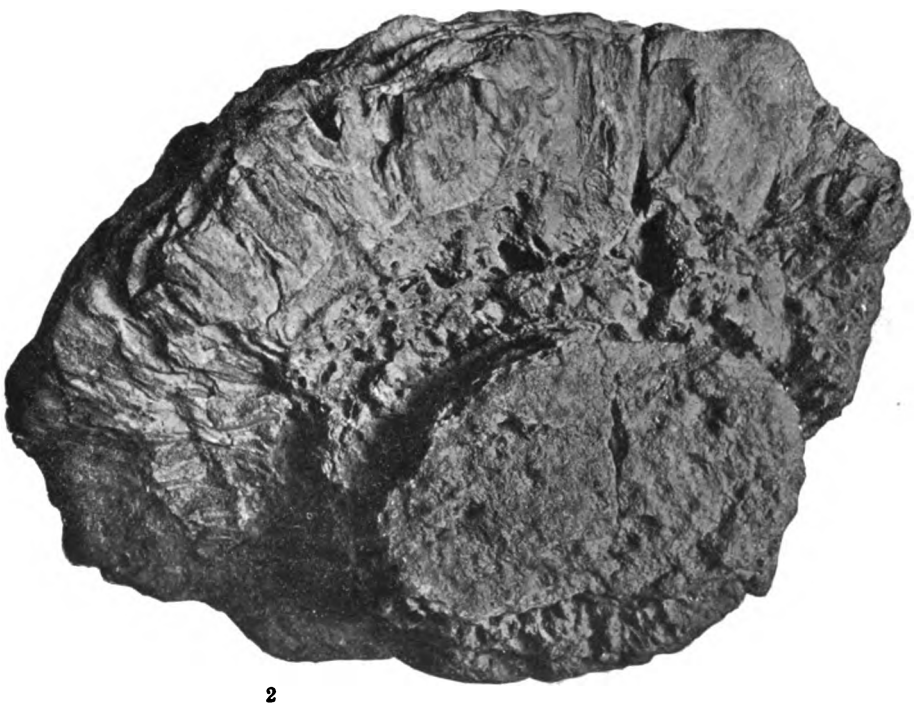

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CYCADEOIDEA FONTAINEANA.

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PLATE XCIX.

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PLATE XCIX.

Maryland Potomac Cycads.

Cycadeoidea Goucheriana Ward. Page.

Side view of the Wilson trunk, No. 1479 of the museum of the Woman's College of Baltimore.... 452

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CYCADEOIDEA GOUCHERIANA.

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PLATE C.

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PLATE C.

Maryland Potomac Cycads.

Cycadeoidea Uhleri Ward. Page.

Side view of the Lee trunk, No. 2 of the museum of the Maryland Academy of Sciences..... 455

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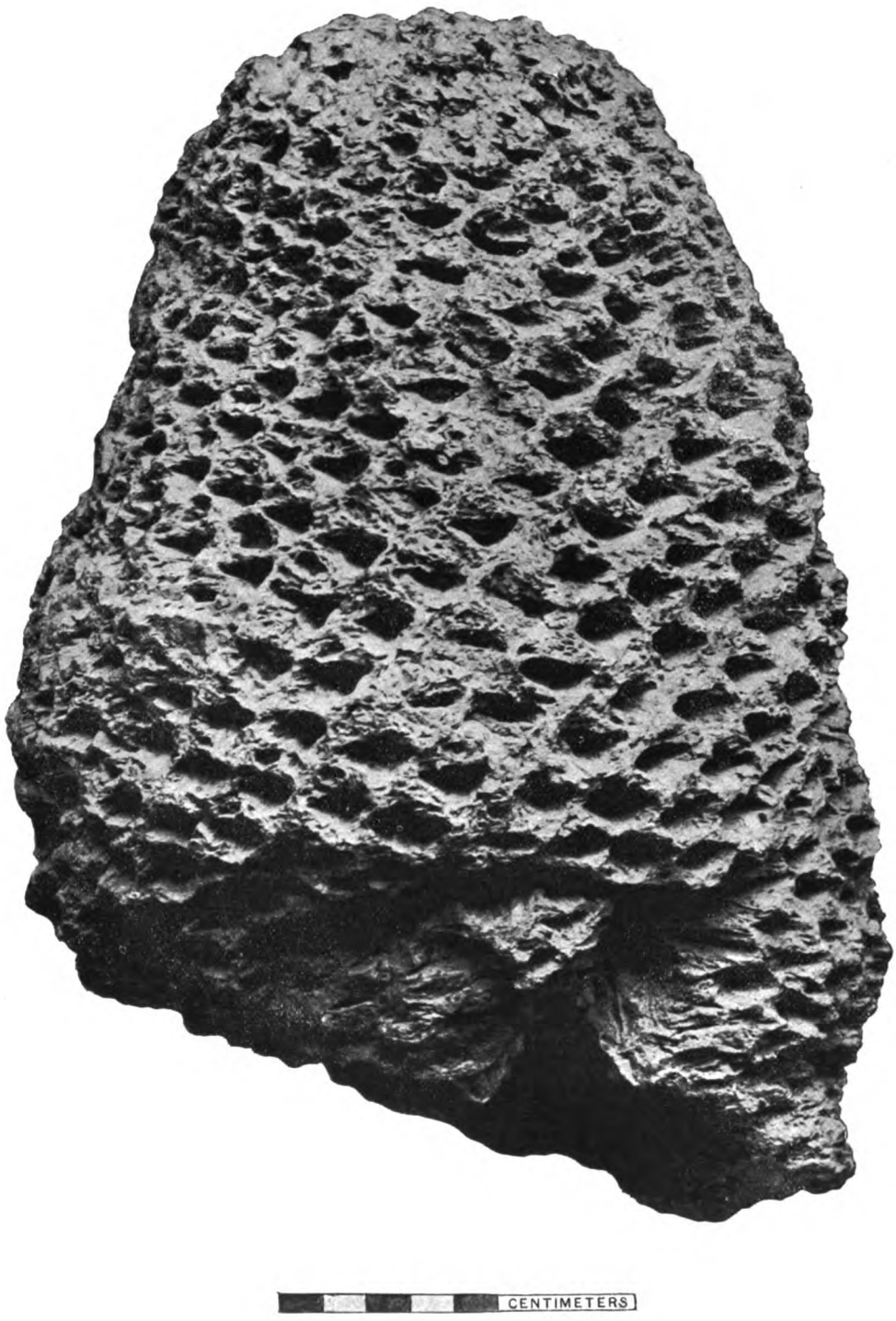

CYCADEOIDEA UHLERI.

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PLATE CI.

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Maryland Potomac Cycads.

Cycadeoidea Bibbinsi Ward. Page.

Side view of the Polly Jones trunk, No. 1427 of the museum of the Woman's College of Baltimore. 468

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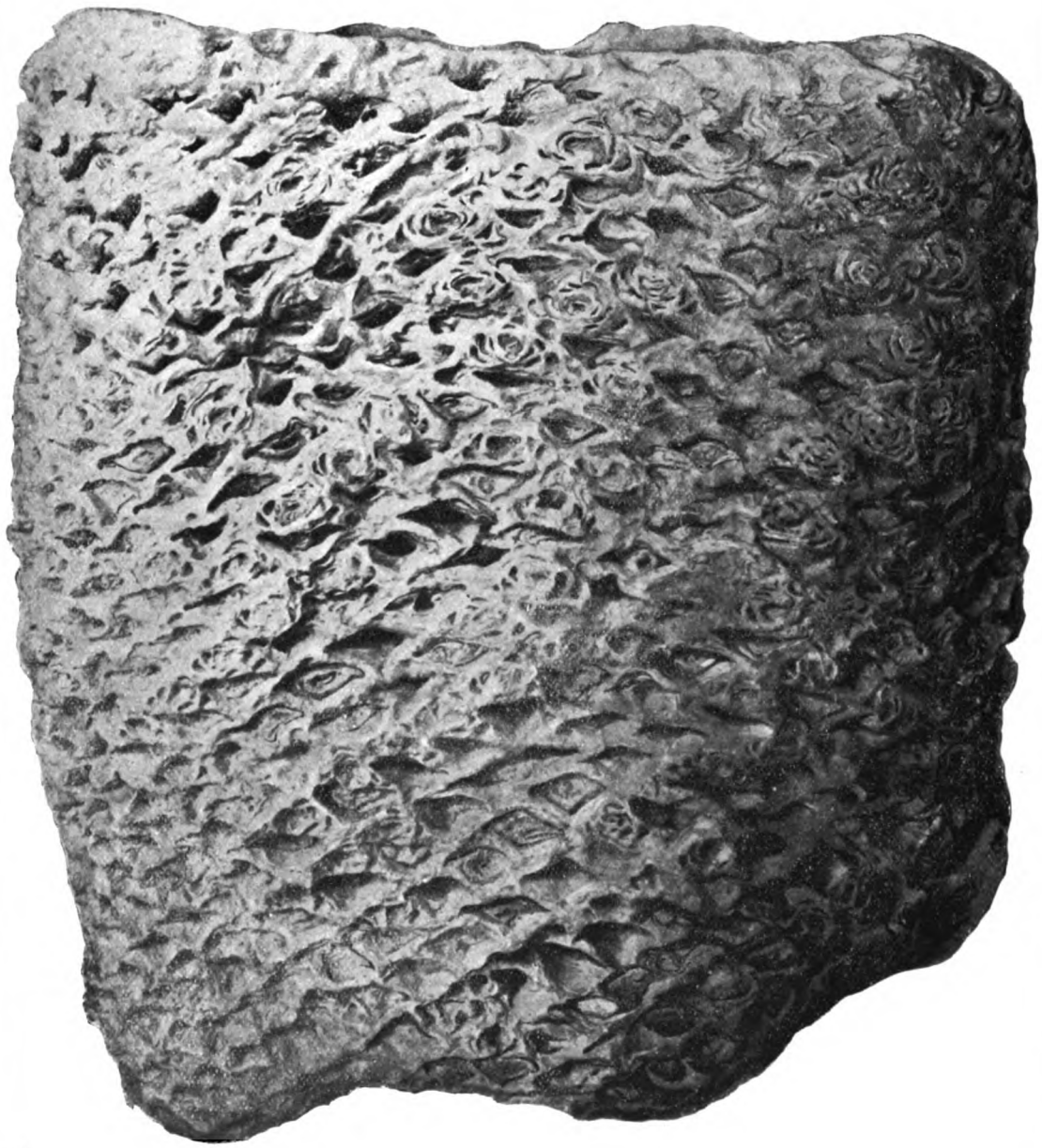

CYCADEOIDEA BIBBINSI.

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PLATE CII.

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PLATE CII.

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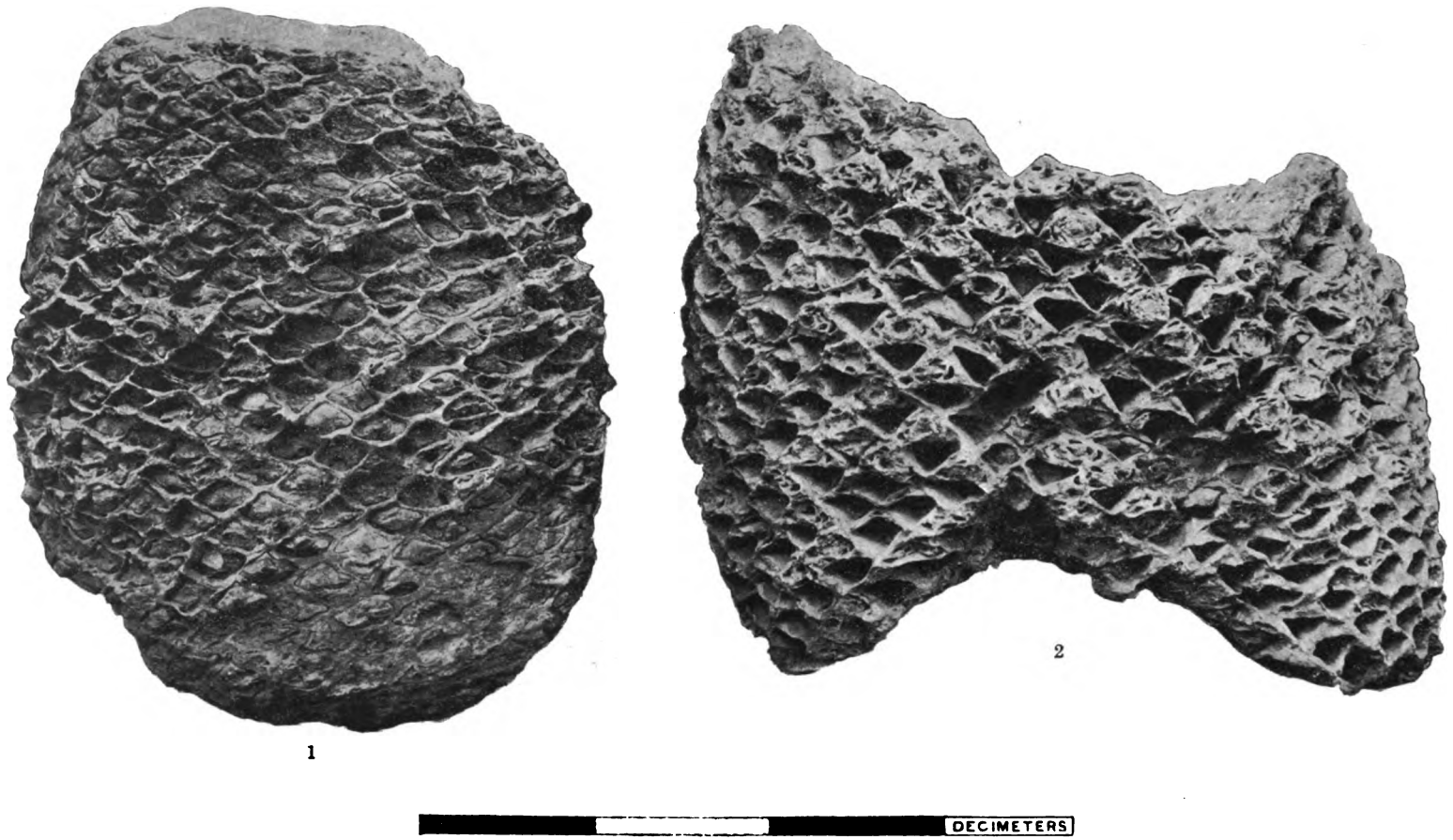

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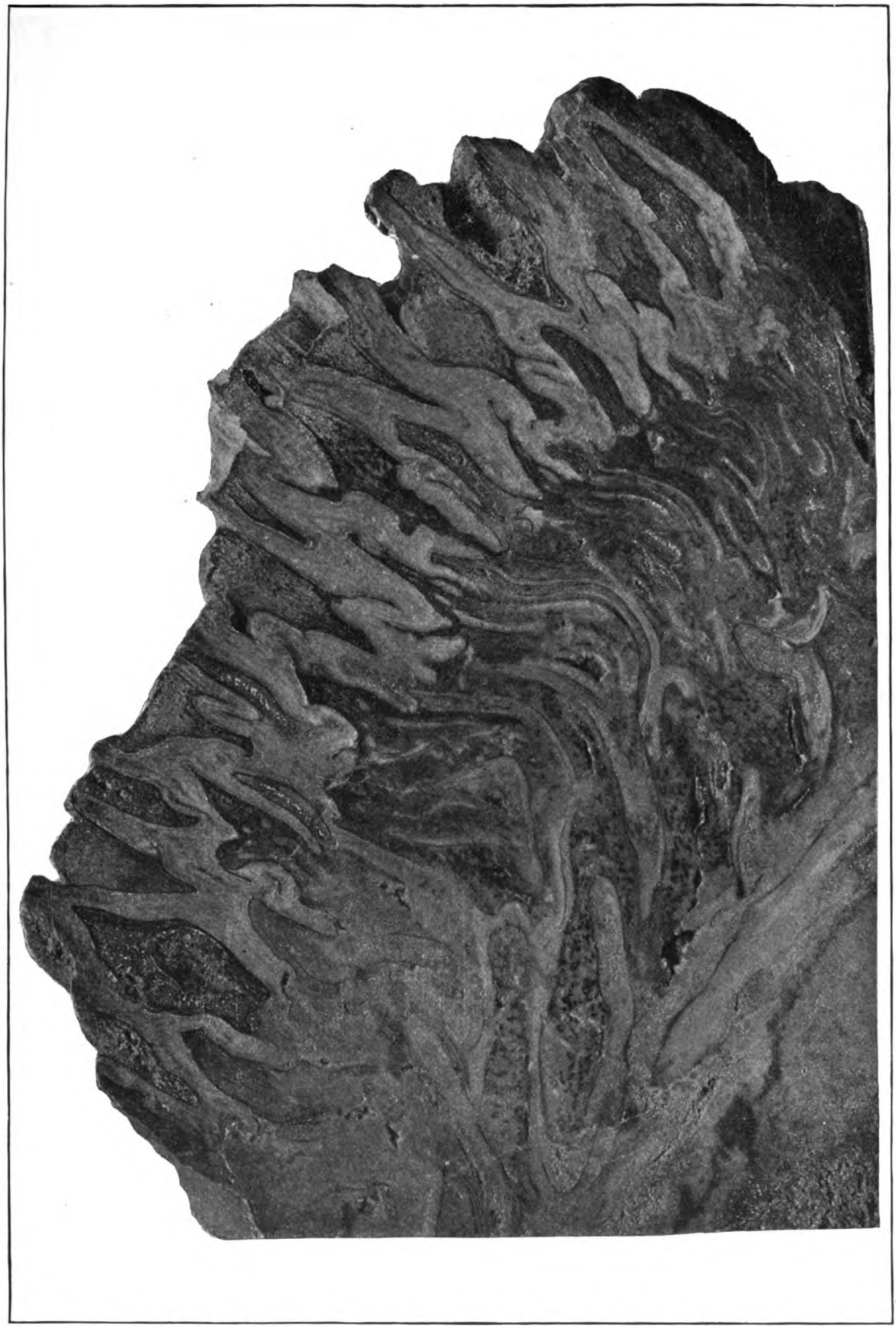

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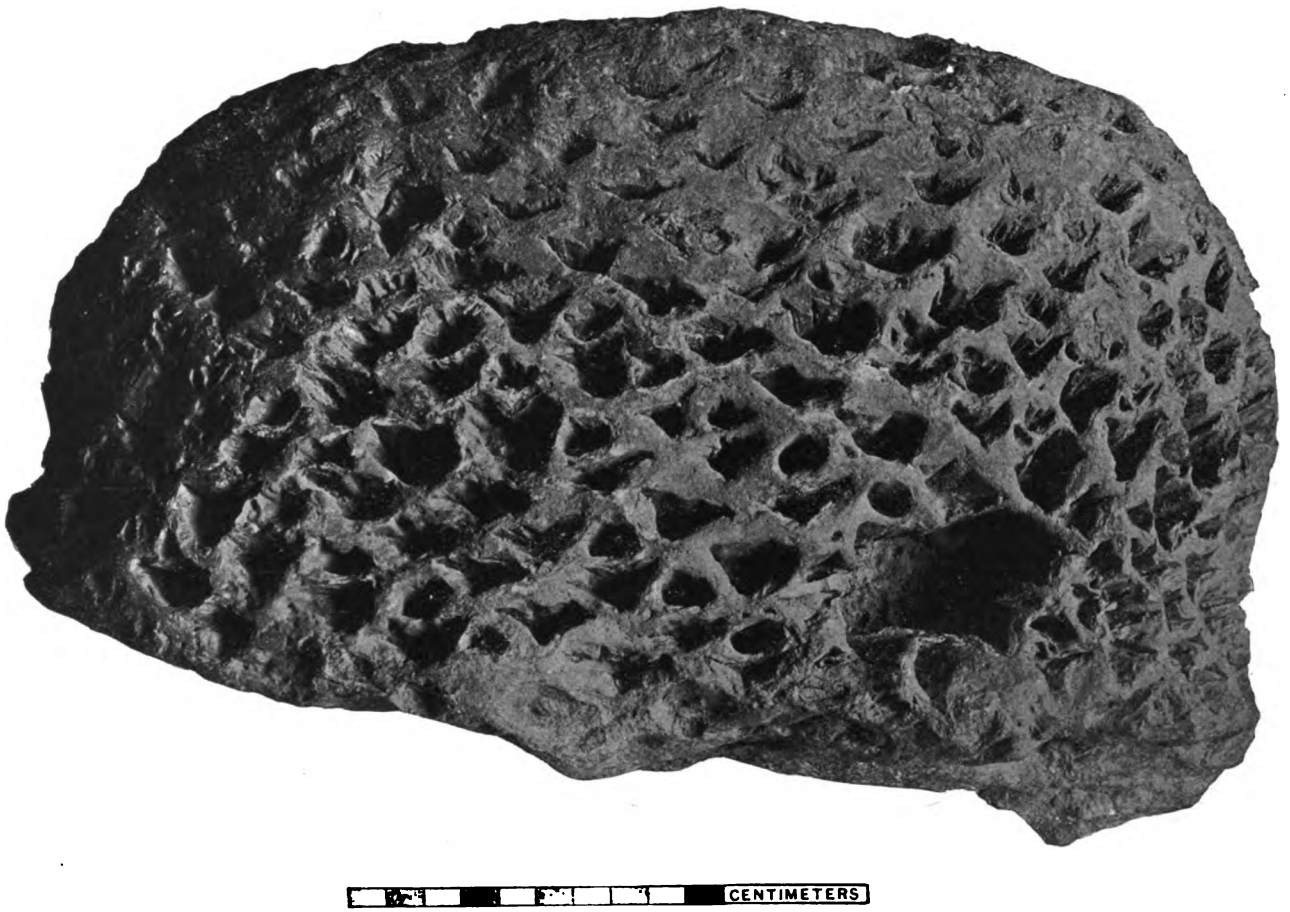

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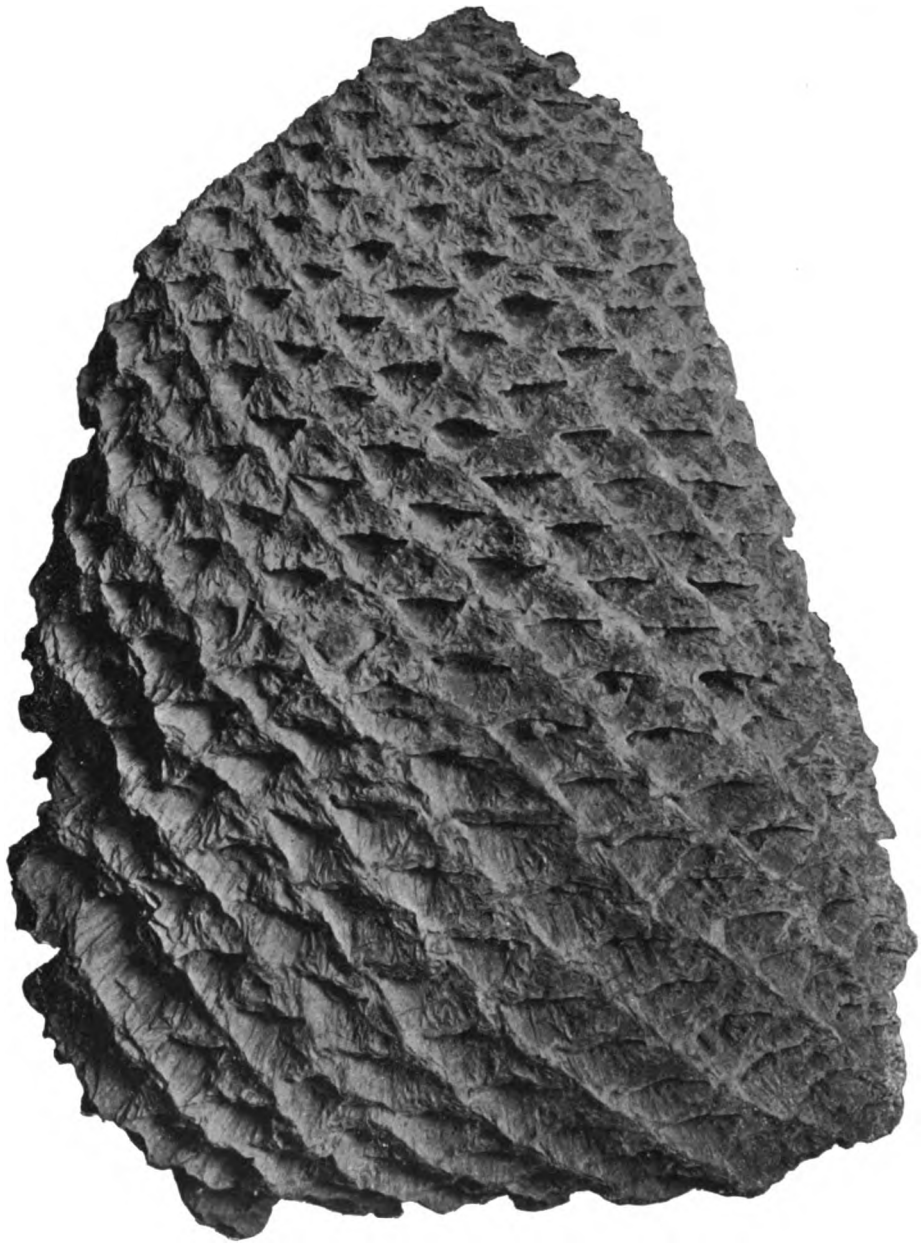

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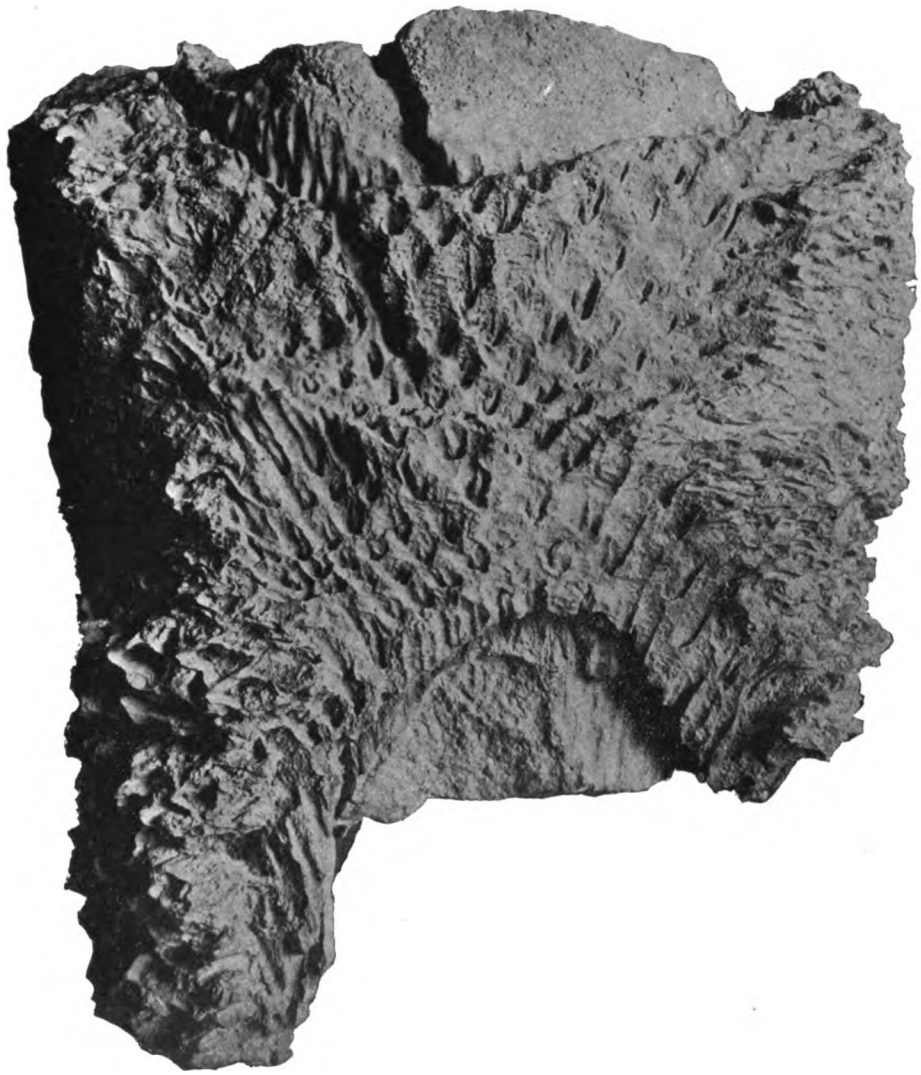

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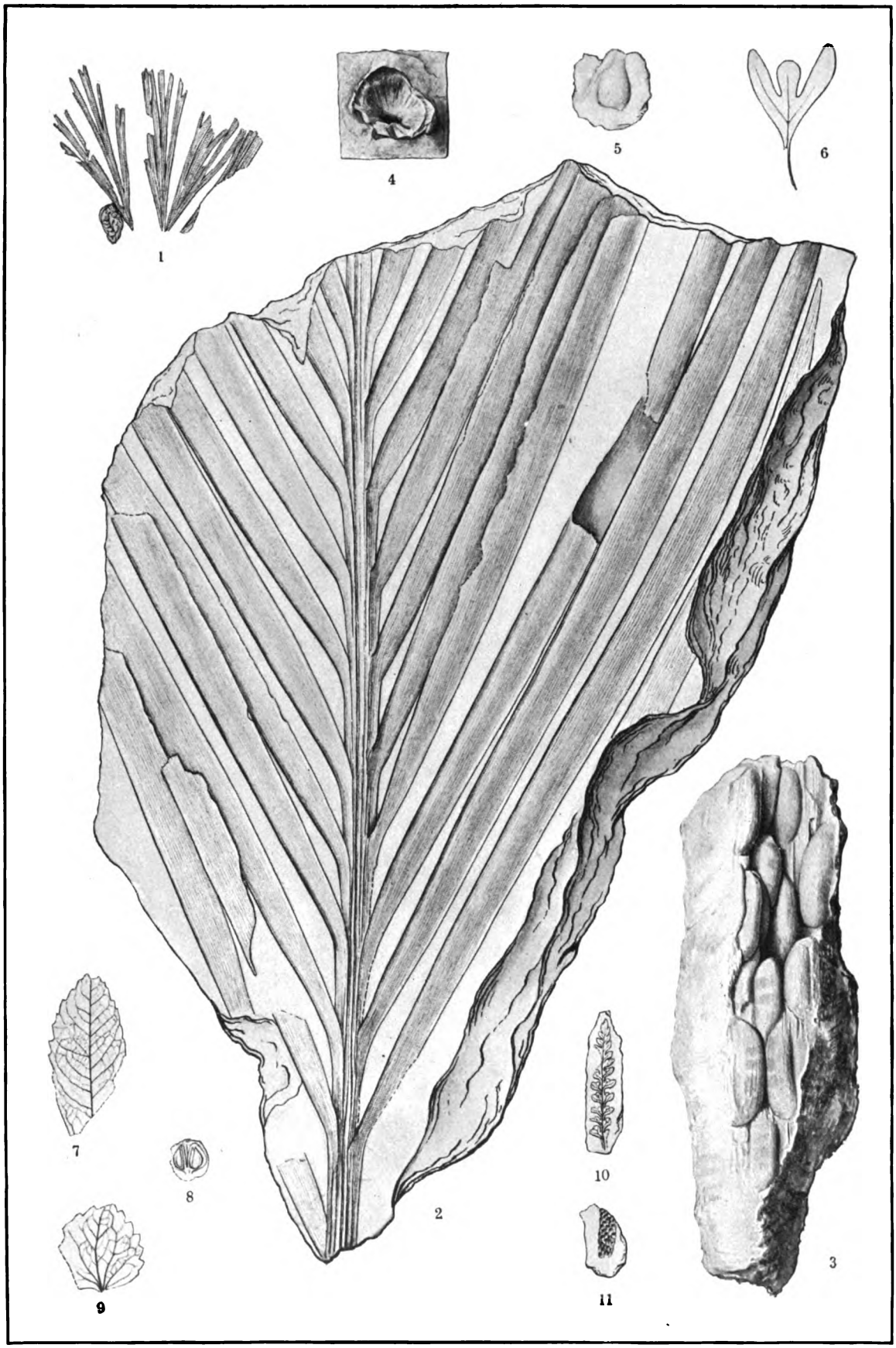

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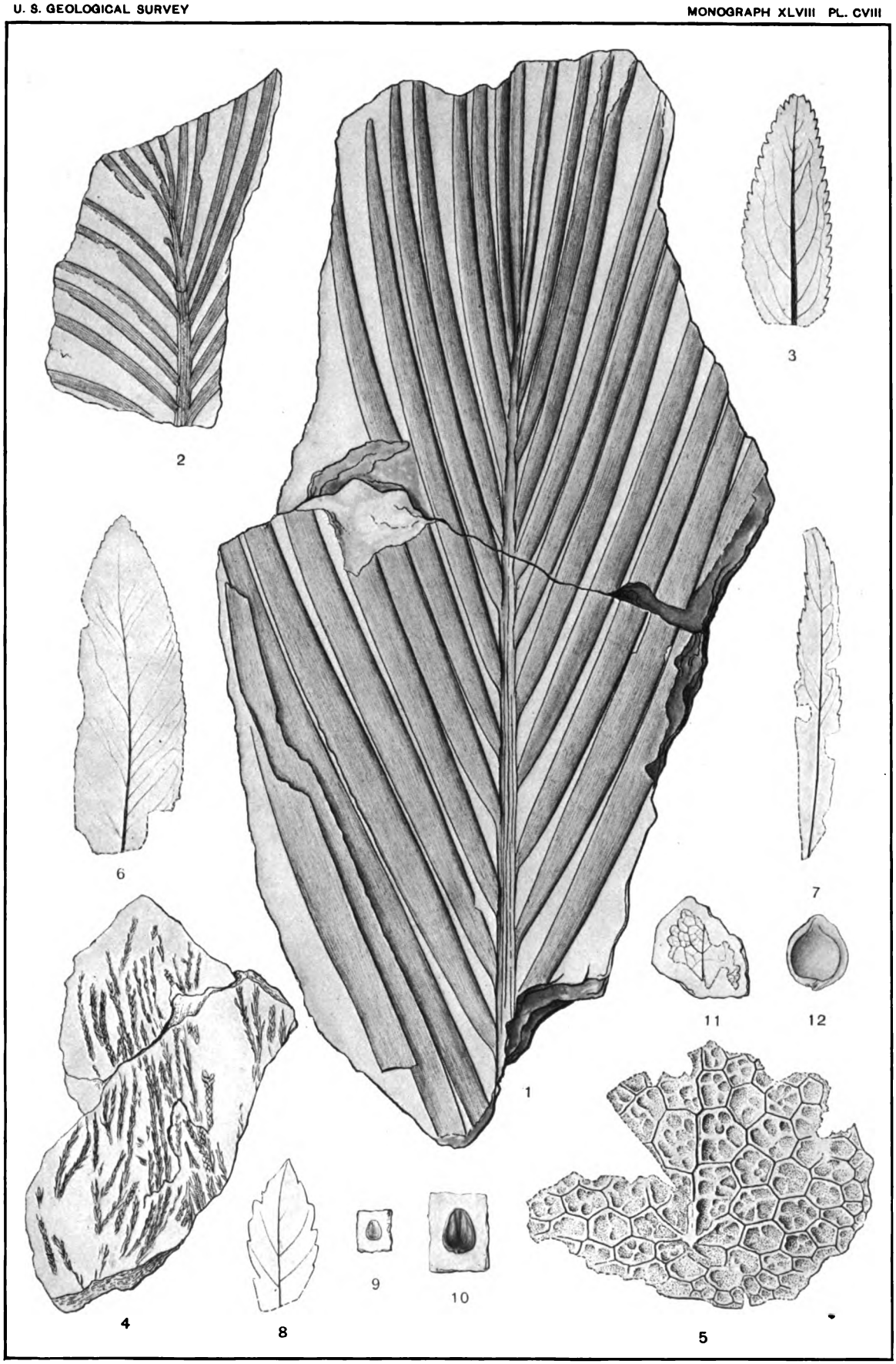

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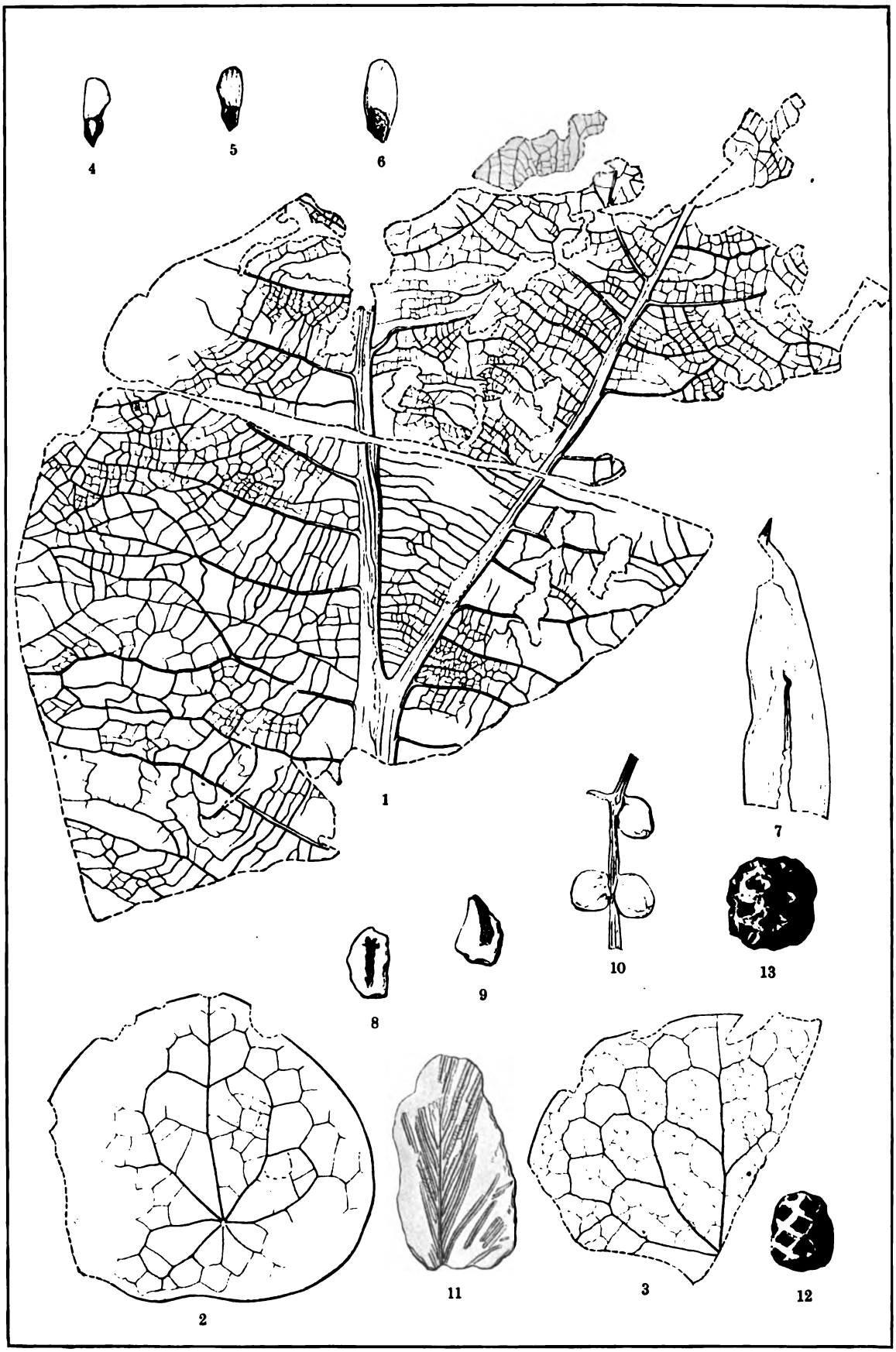

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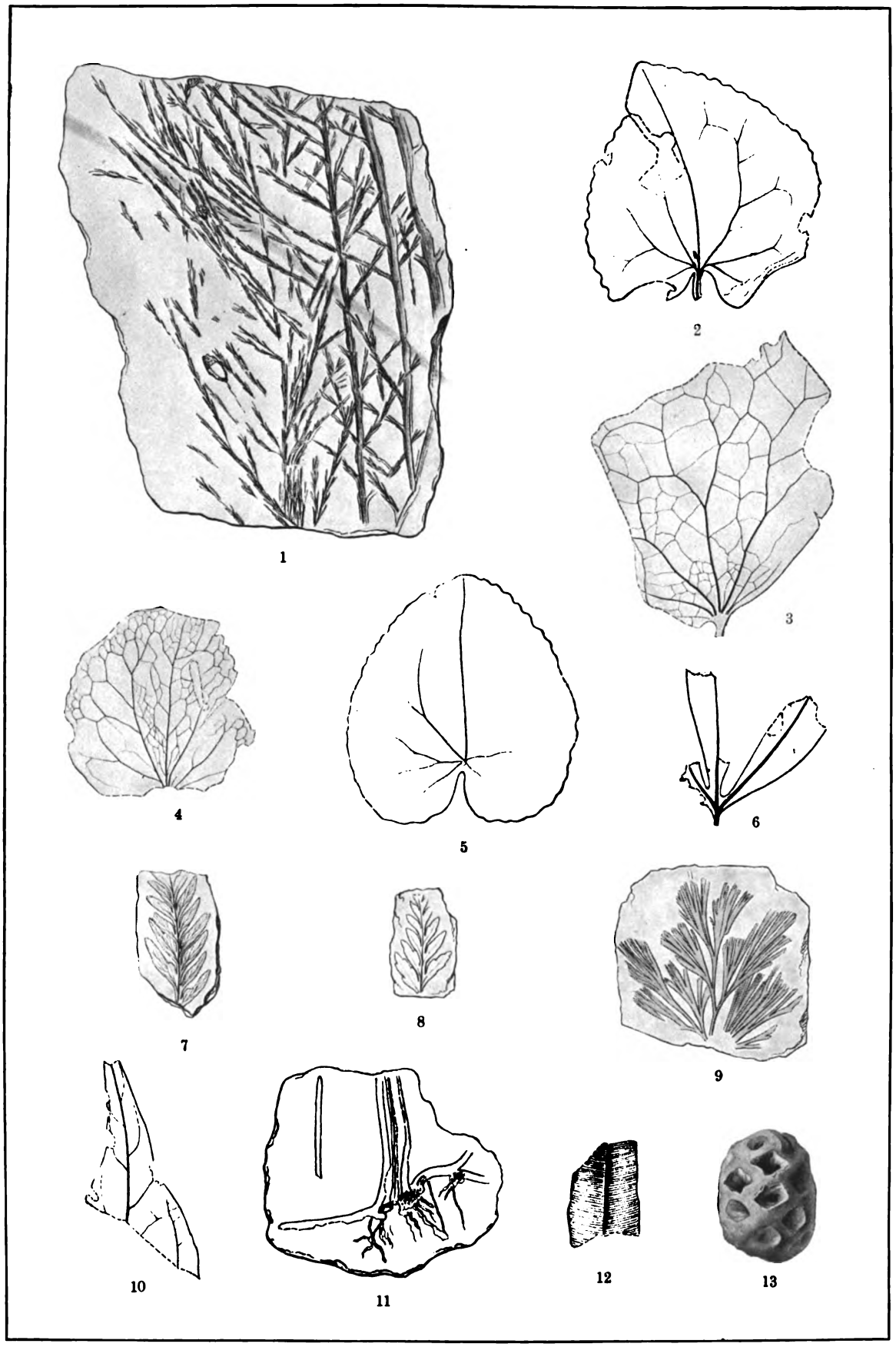

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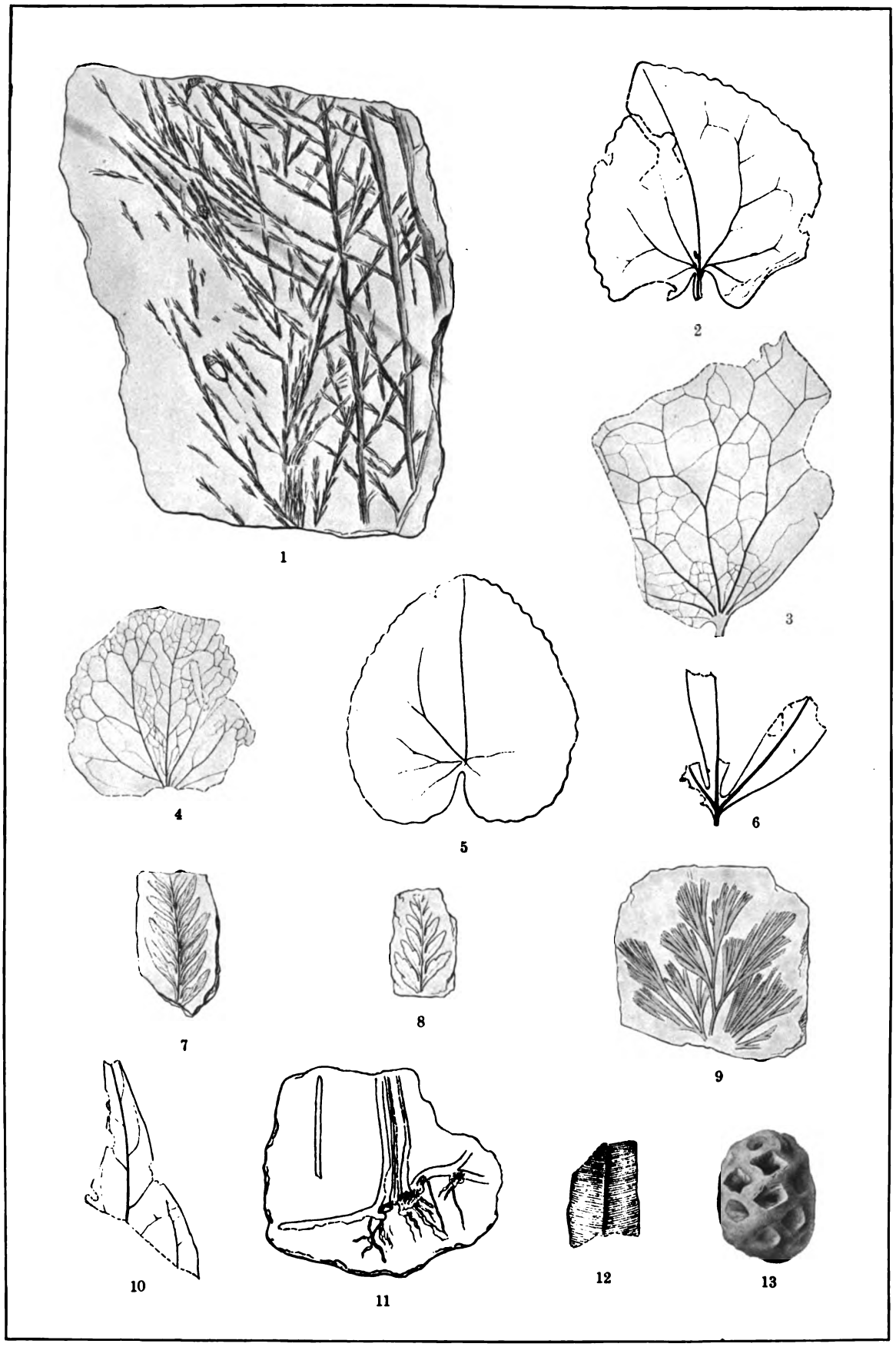

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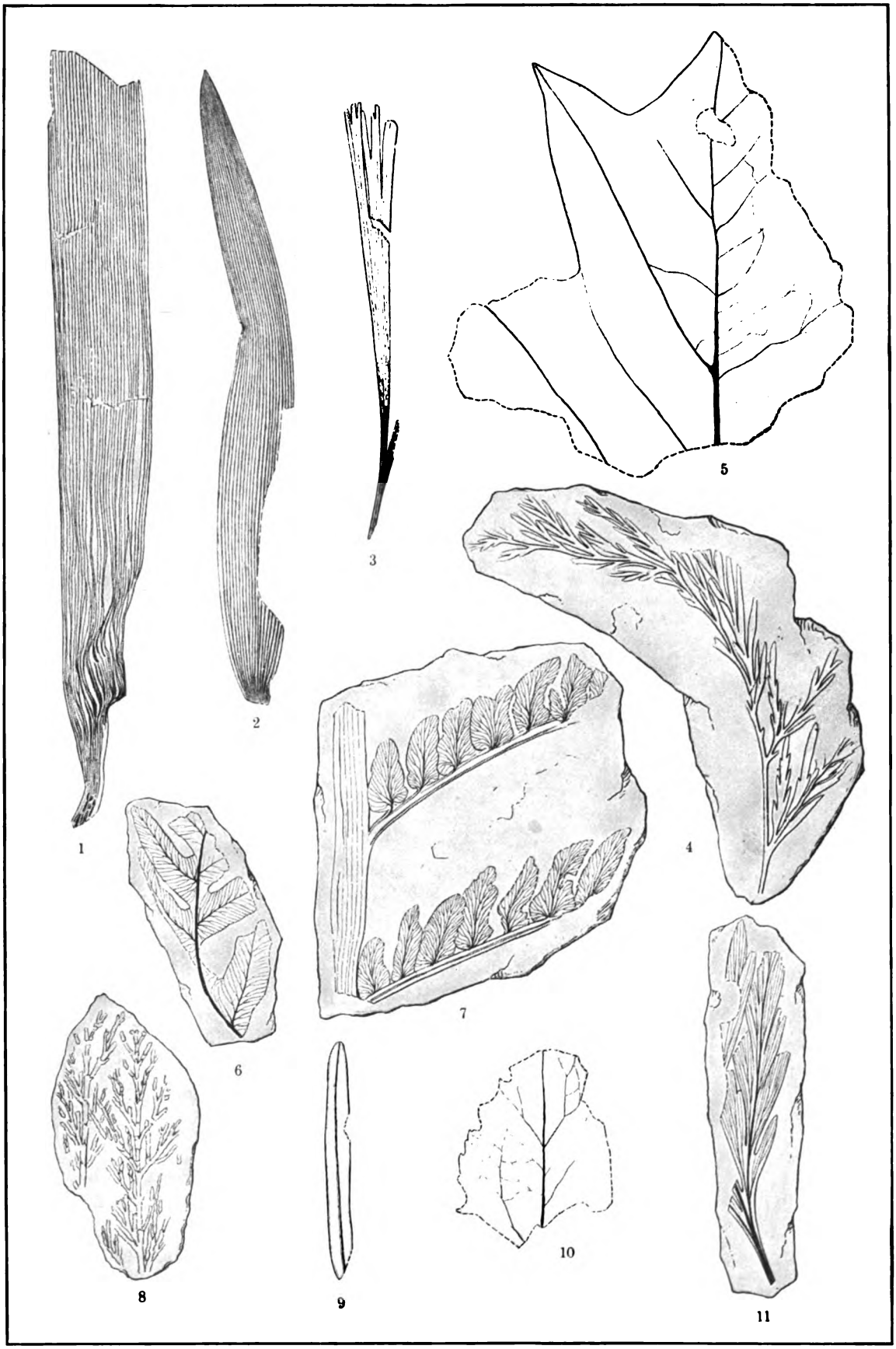

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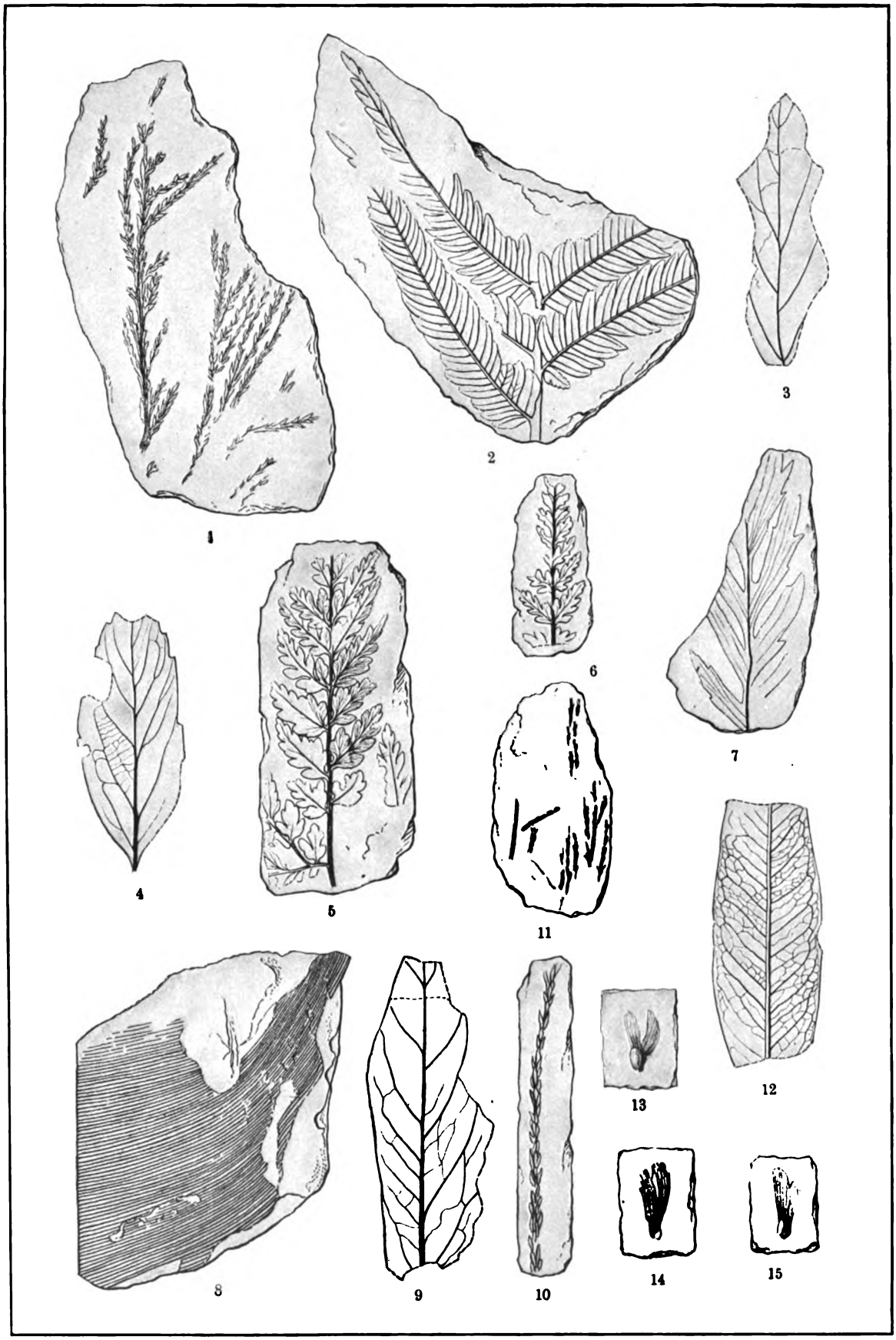

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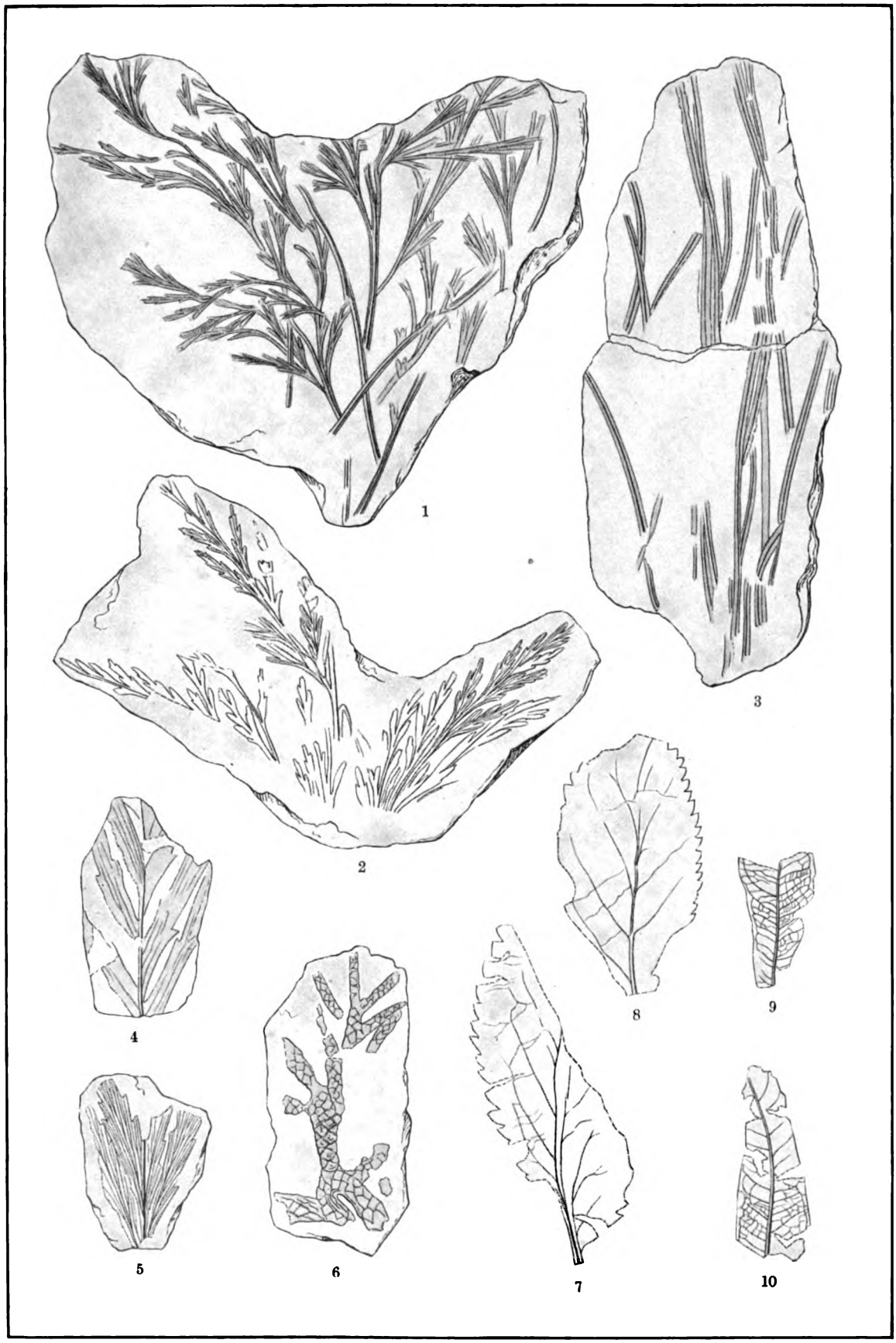

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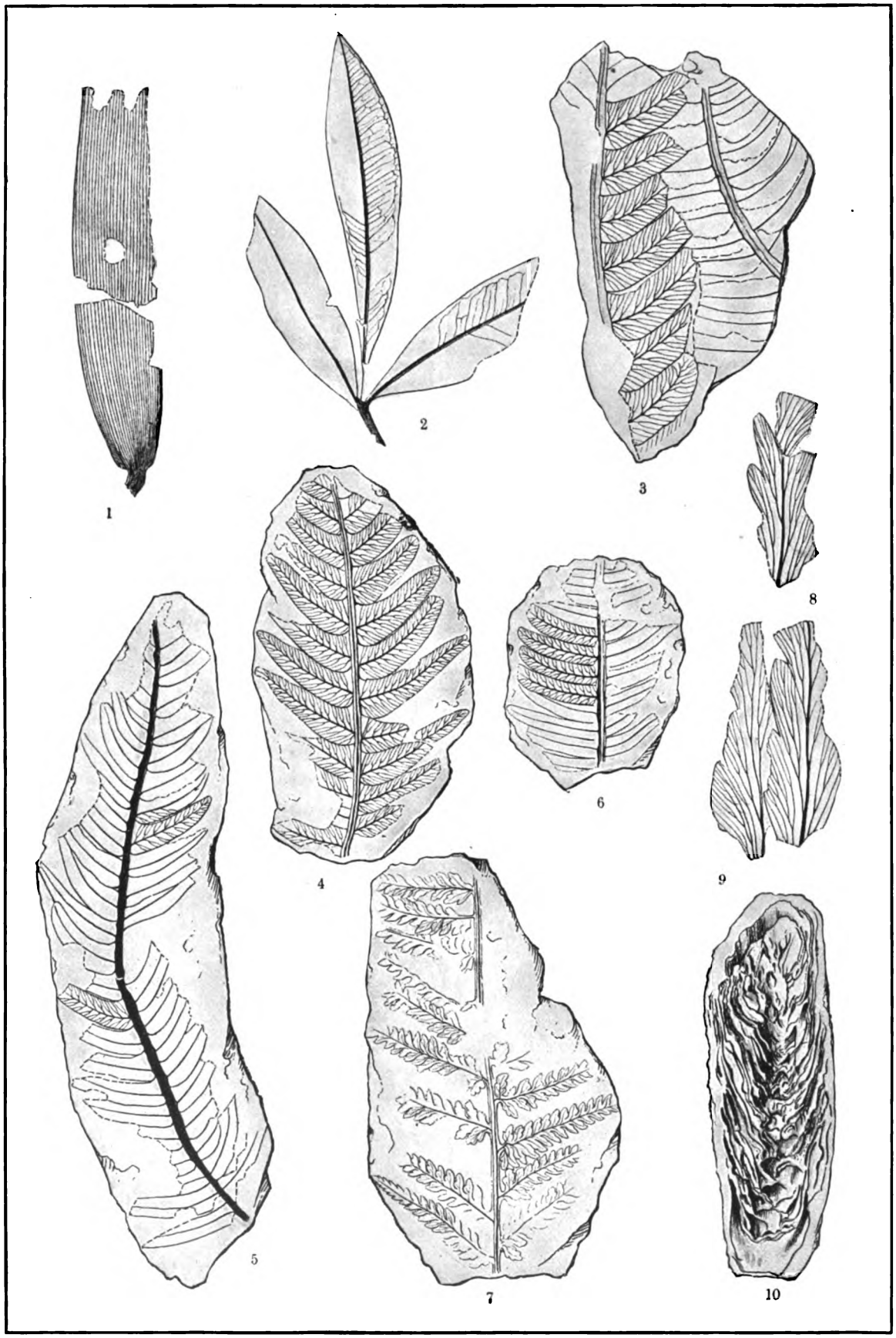

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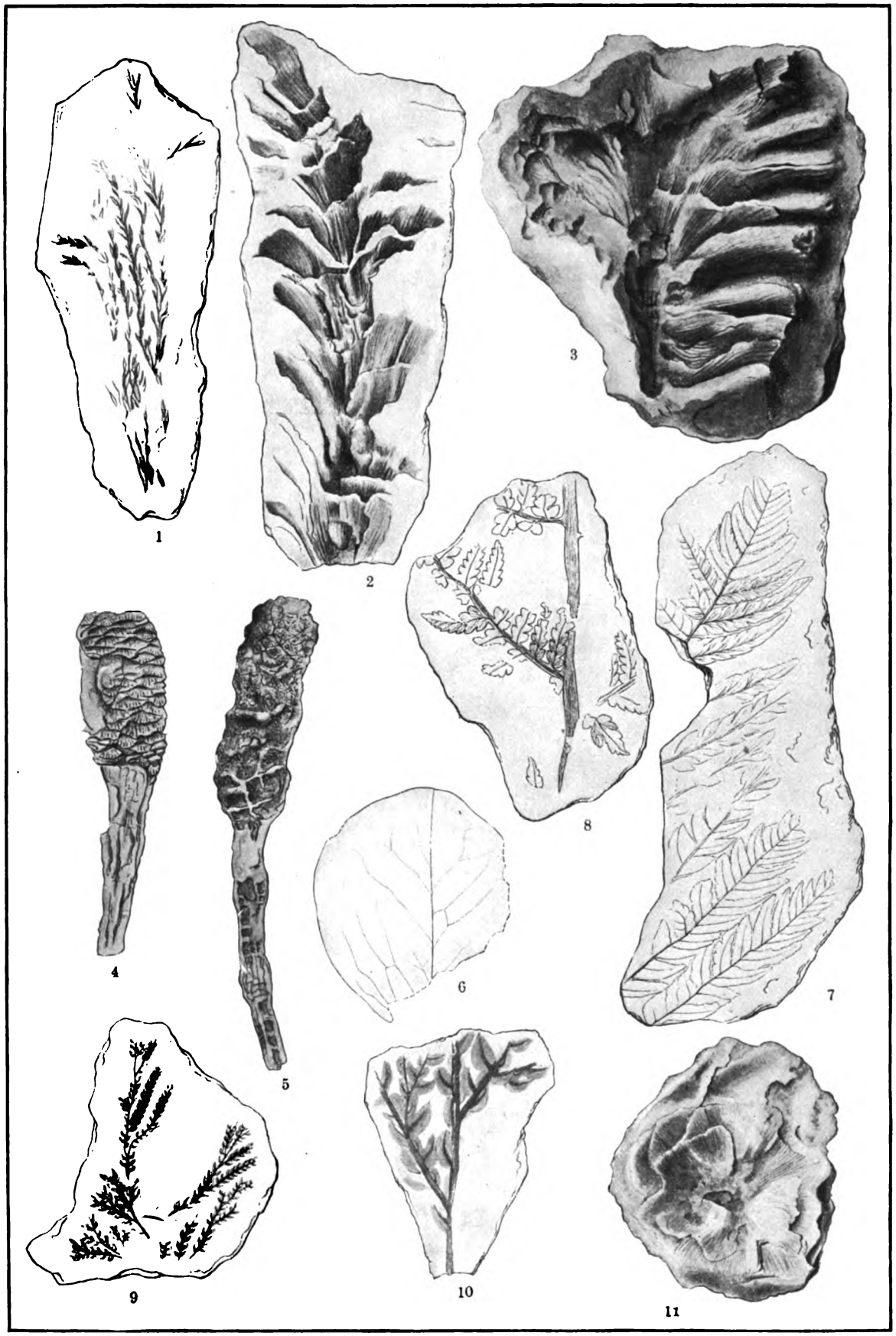

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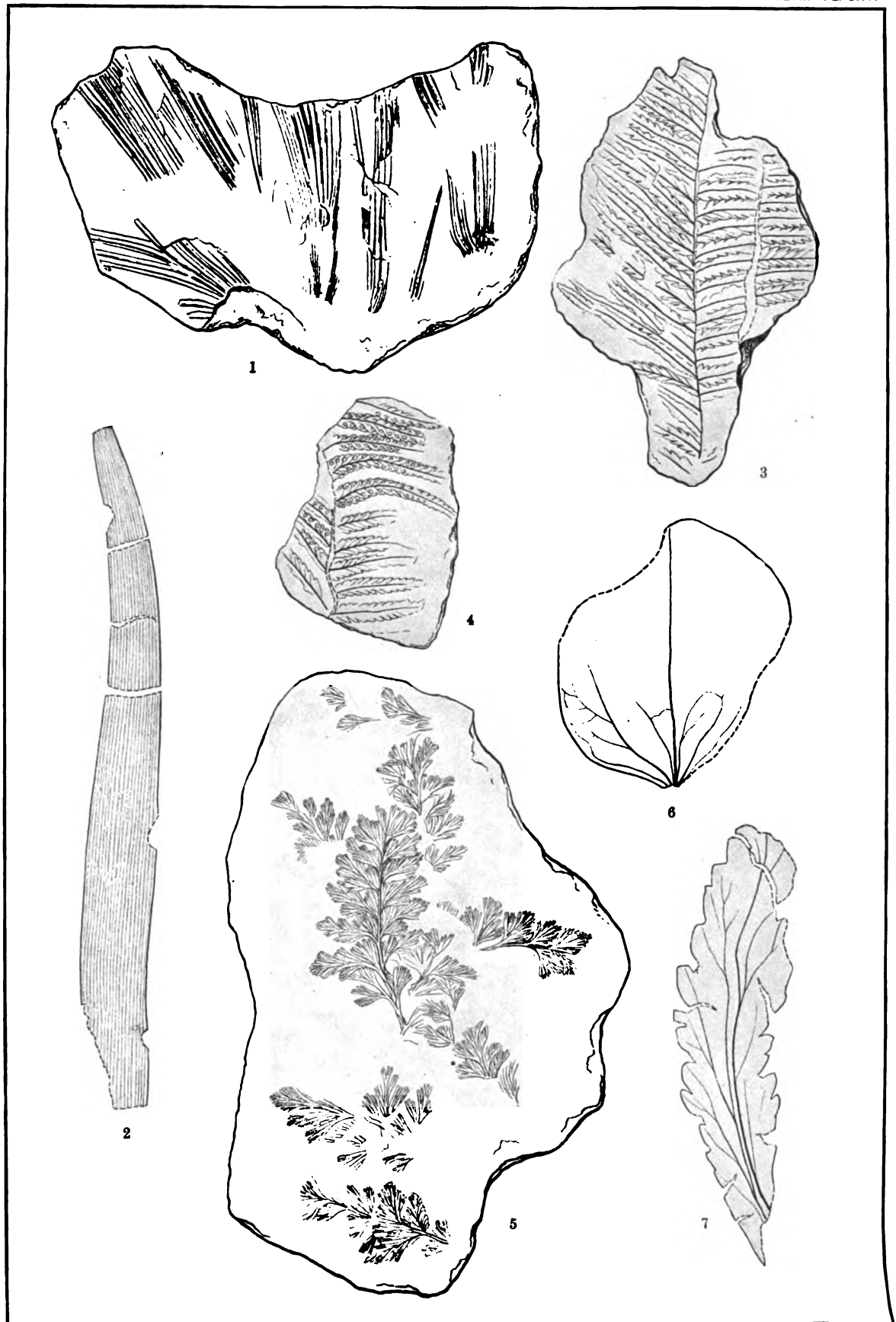

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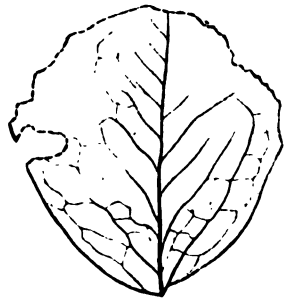

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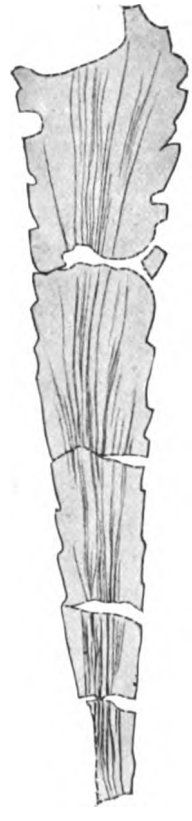

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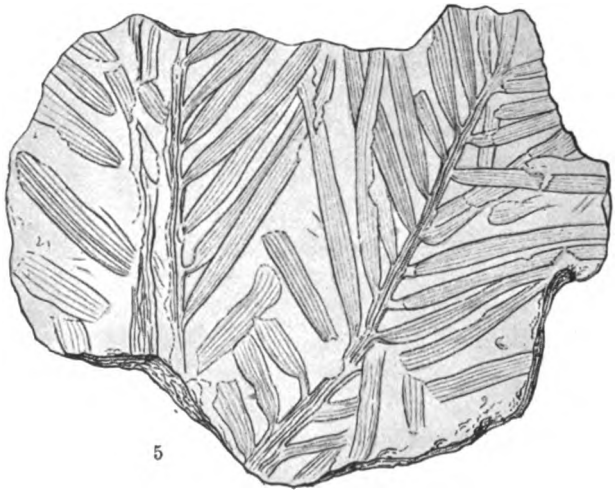

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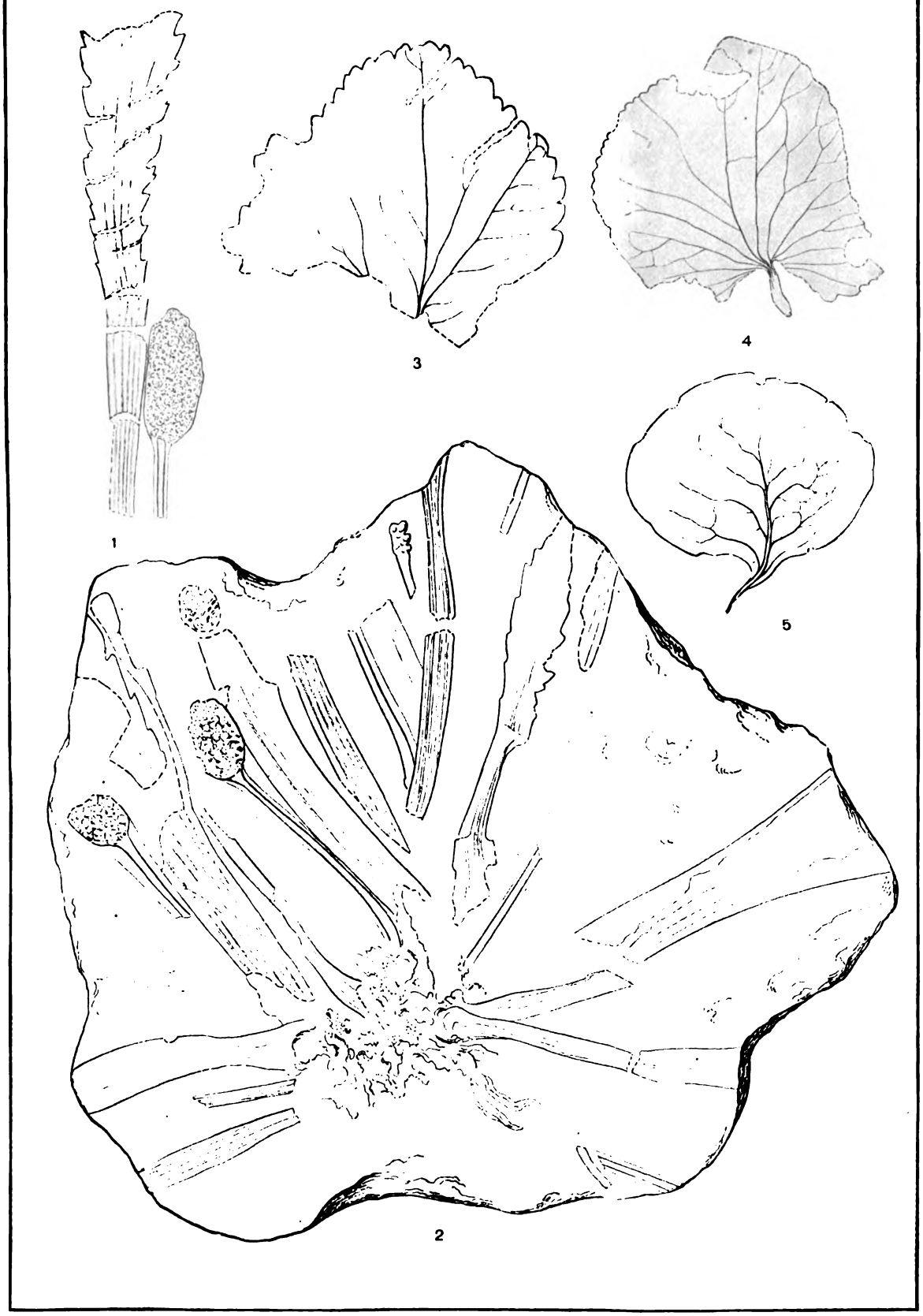

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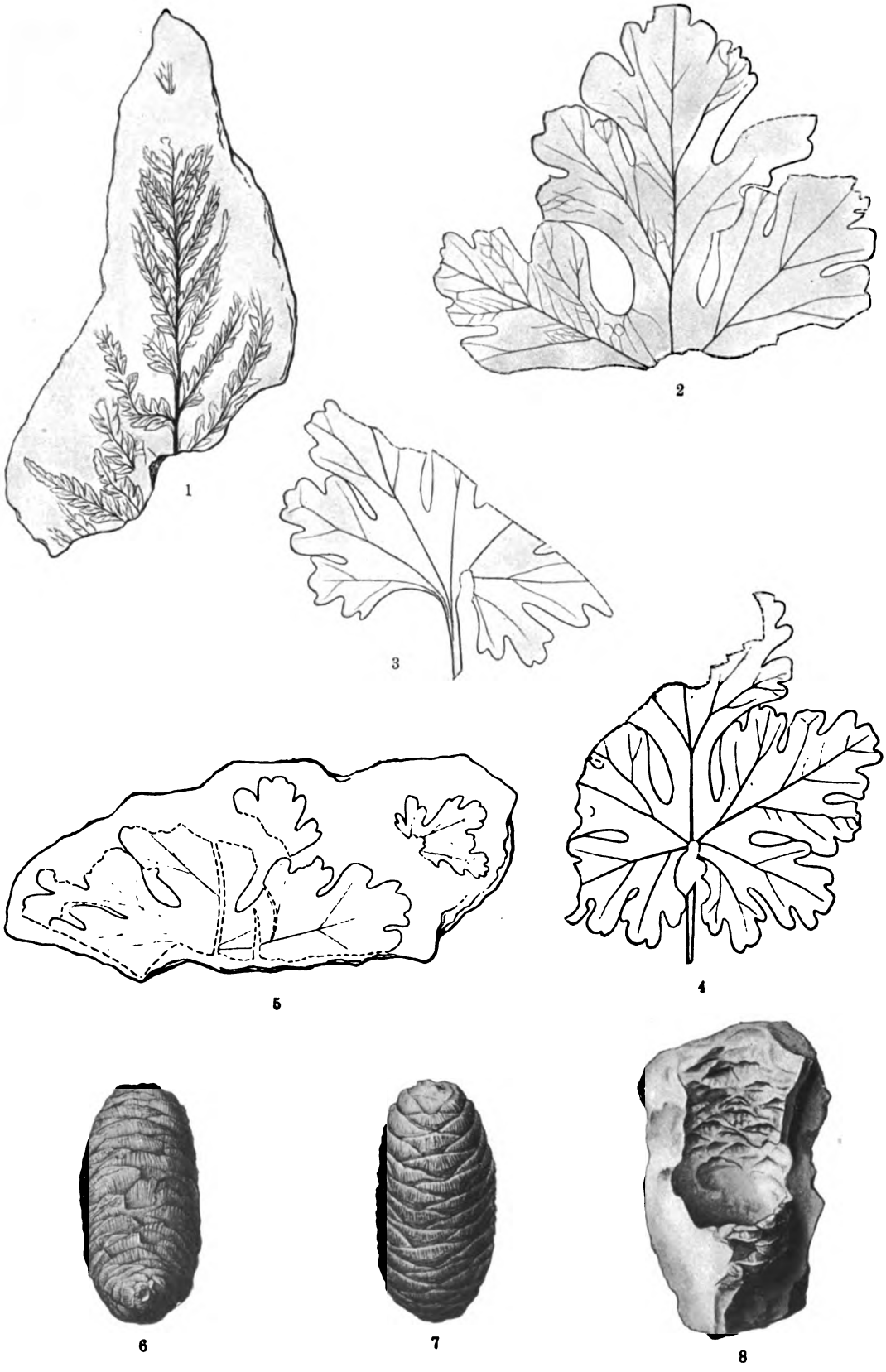

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